

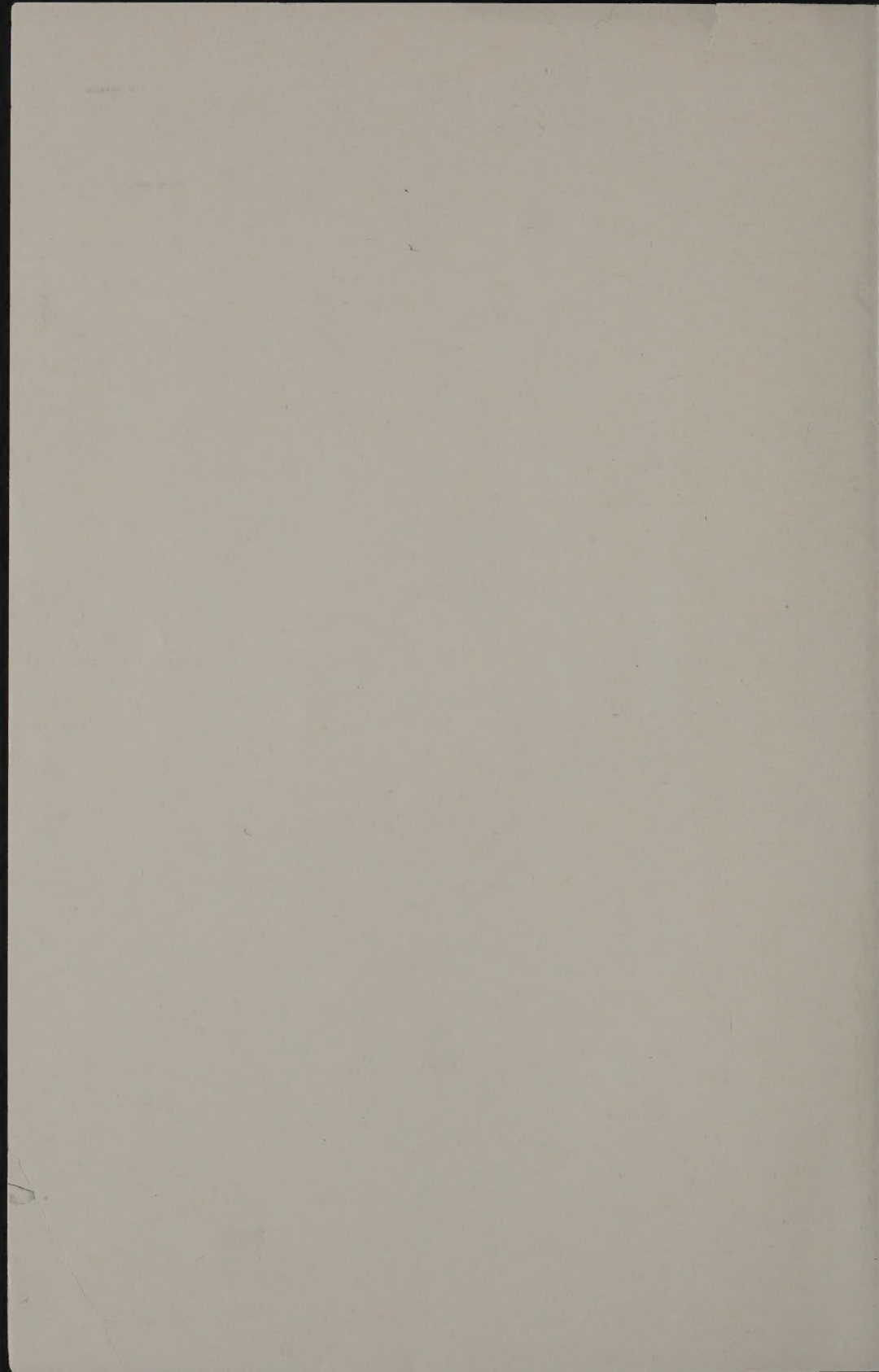
STATE OF NEVADA

*Biennial
Report:
Fiscal Years
1955-1956*



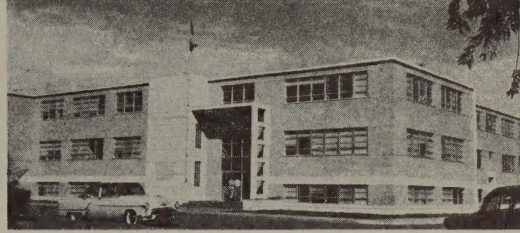
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DEPARTMENT OF HIGHWAYS



Biennial report of the
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*To The
Honorable Members
of the
Board of Directors
and the
Nevada State Legislature*



Your State Highway Engineer respectfully submits herewith the Twentieth Biennial Report of the Department of Highways, embracing the activities of the Department for the fiscal years 1955 and 1956.

We take this opportunity to express our sincere appreciation for the cooperation and support received from the Board of Directors, the Bureau of Public Roads, and the people of this State.

H. S. Mills

State Highway Engineer.

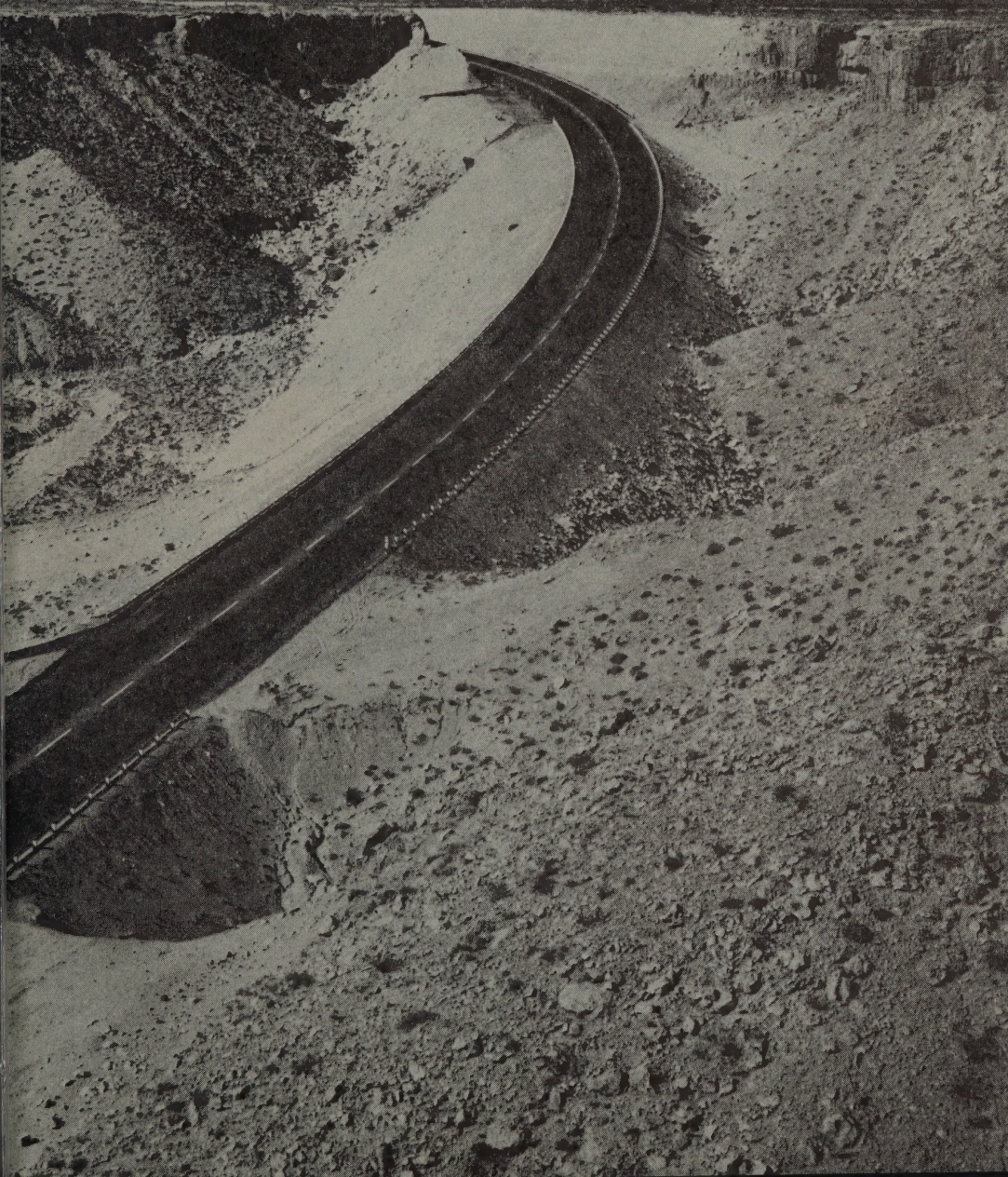
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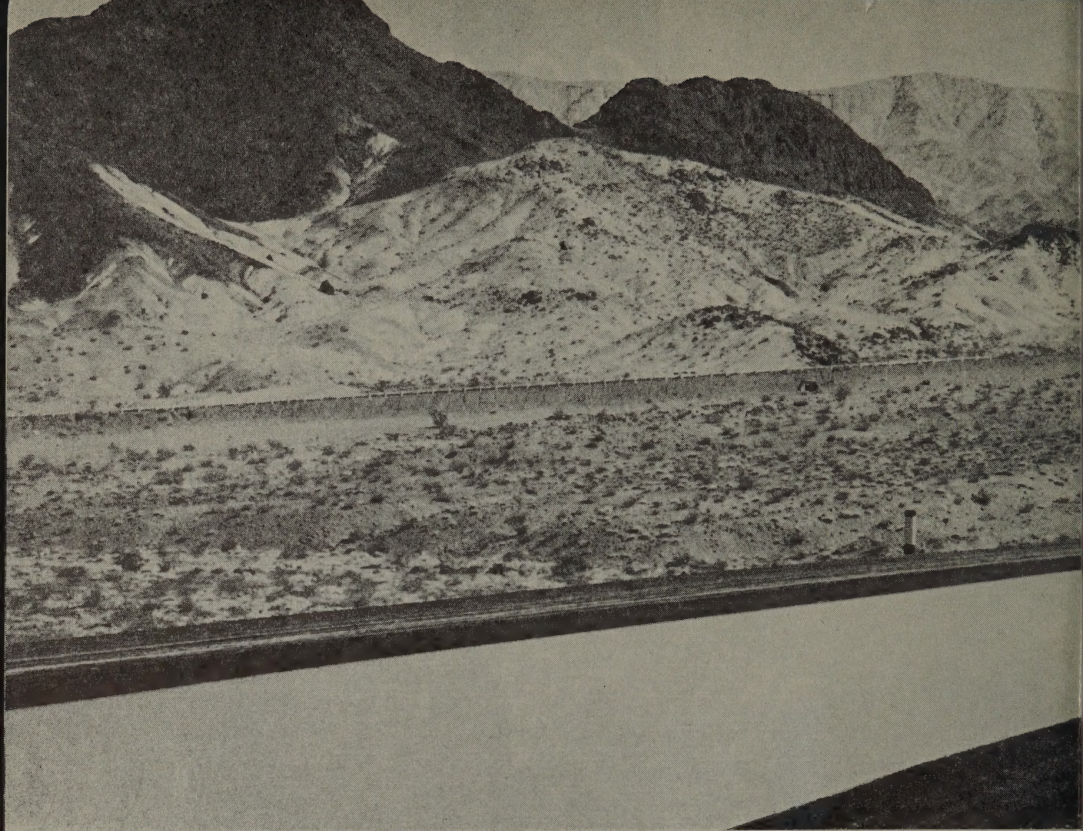
STATE OF NEVADA
DEPARTMENT



20th

BIENNIAL REPORT
OF HIGHWAYS





*Biennial Report for the
Fiscal Years of
July 1, 1954
to June 30, 1956*



CARSON CITY, NEVADA
State Printing Office
Jack McCarthy, Superintendent

H. D. MILLS
State Highway Engineer





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State Controller, Member

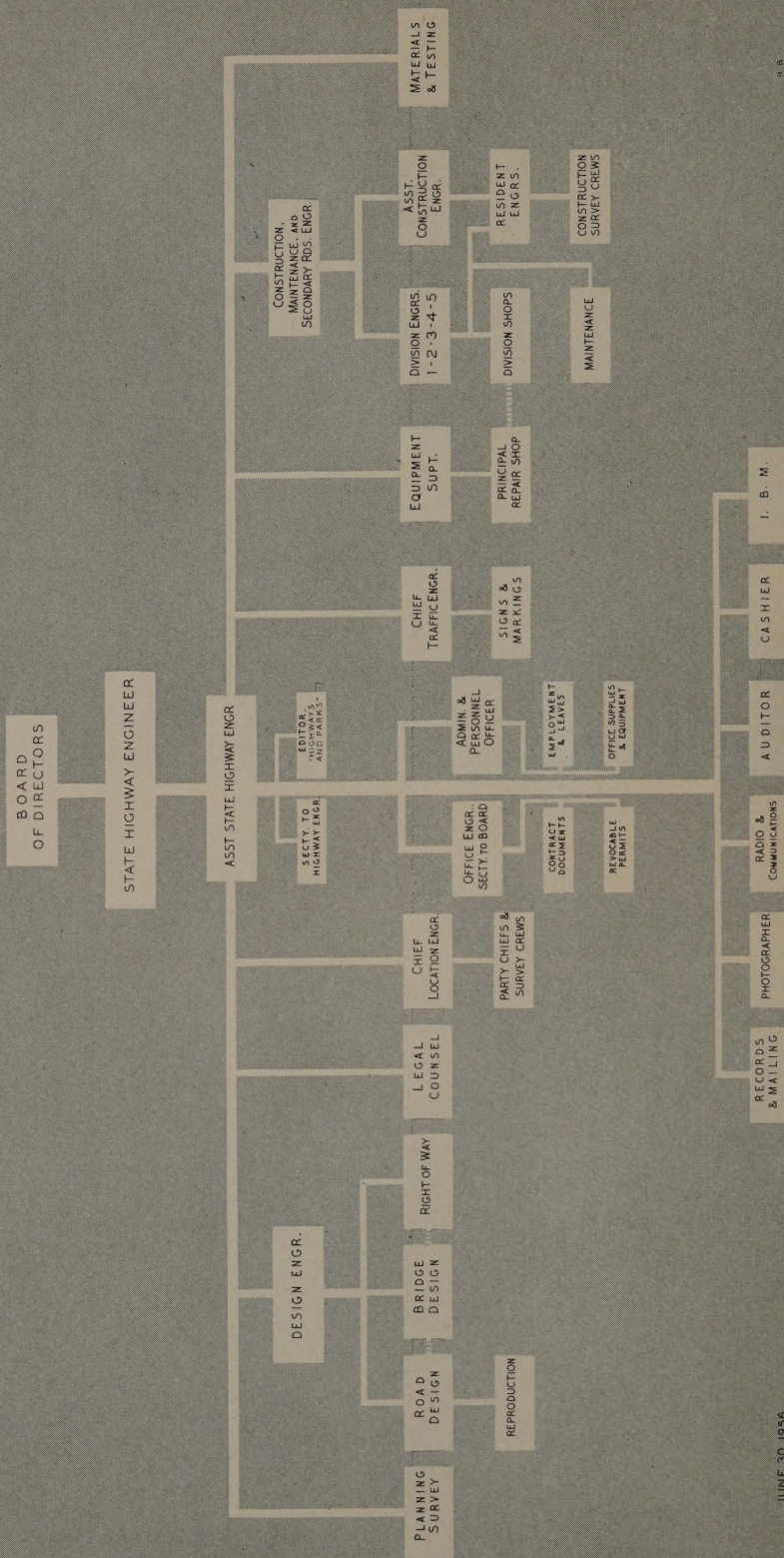
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Chairman of the Board

HARVEY DICKERSON,
Attorney General, Member



ORGANIZATION CHART

STATE OF NEVADA DEPARTMENT OF HIGHWAYS



HIGHWAY OFFICIALS & DEPARTMENT HEADS

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HEADQUARTERS DIVISION HEADS

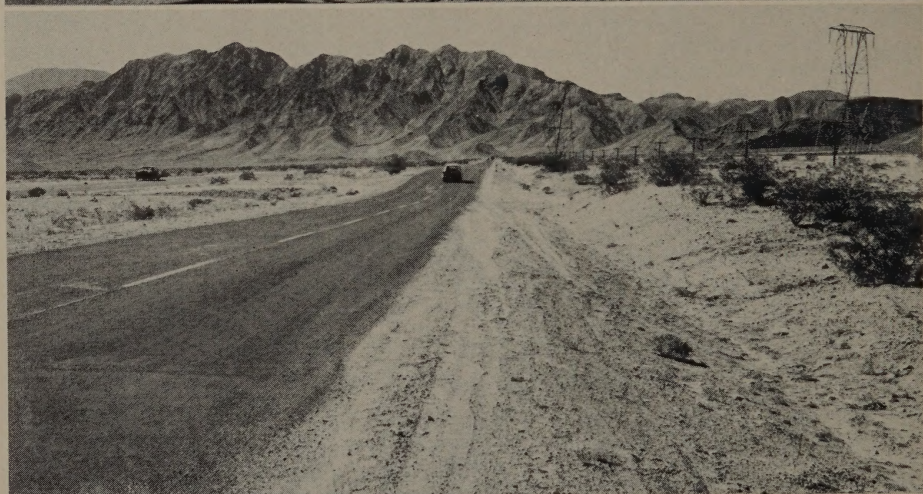
H. D. MILLS	State Highway Engineer
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A. G. KINNE	Chief Design Engineer
J. D. MEACHAM	Construction, Maintenance and Secondary Roads Engineer
A. BERNING, JR.	Administrative and Personnel Officer
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ORVIS REIL	Chief Planning Survey Engineer
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PAUL R. RAWLS	Chief Location Engineer
RALPH J. OTTINI	Chief Traffic Engineer
R. E. ELDRIDGE	Assistant Highway Construction Engineer and Federal Aid Coordinator
STANLEY D. SUNDEEN	Office Engineer
L. W. LITTLE	Assistant Materials and Research Engineer
OREN W. WALKER	Chief Road Designer
E. C. POHL	Auditor
DONALD L. BOWERS	Editor, Nevada Highways and Parks Magazine
ROGER E. GAUGLER	Radio and Communications Supervisor

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J. L. HANCOCK	Division No. 2
JULIAN A. GLOCK	Division No. 3
W. R. PARRY	Division No. 4
G. B. BROCKWAY	Division No. 5

ASSISTANT DIVISION ENGINEERS

JACK PARVIN	Division No. 1
H. A. SQUIRES	Division No. 2
DALE V. ROSE	Division No. 3
PAUL ROBBINS	Division No. 4



Careless motorists who litter the roads of Nevada are a growing problem. Cost to the Highway Department in cleaning up after litterbugs during the past two years was over half a million dollars! Better highway manners would save taxpayers' money.

Highway Engineer's

INTRODUCTION

Describing the Highway Department today and predicting the situation here in the years ahead is one word—expansion. To meet the constant need for better roads in the State, to handle the upsurge in traffic measured every year, and to utilize the Federal funds now available for the greatest road building program in history, we have only one alternative, to grow.

As indicated in our last biennial report, we anticipated a considerable expansion in 1955 because of the then-pending 1954 Federal-aid bill which upped Nevada's share of construction funds by almost 50 percent over any previous Congressional grant. When these funds became available on July 1, 1955, this Department was ready. We had increased our personnel by about 20 percent, taking on some 150 new people for our engineering, maintenance and clerical operations and, in the process, used up every inch of our available office space. Results of this larger Federal-aid program are reflected clearly in the construction we completed during the biennium—151 miles of new highways and 305 miles of reconstructed roads, all meeting the exacting Federal standards in force today.

During this same period our day-to-day maintenance operations reached the greatest volume in our history, exceeding \$5 million in the last two years. Mileage of roads being maintained by this Department rose to 4,027, a figure that is meaningful when it is remembered that although only a relatively few miles are added each year, the job of maintaining the majority of these—roads which have been in service 10 or 20 years or longer—is constantly more expensive. These highways, long outdated by modern standards, cost us more to keep open and in satisfactory running condition than our new roads and would be replaced at once if we could afford it.

Complicating our maintenance operation is the fact that in addition to normal wear and tear, the roads in our State have to withstand a heavier flow of traffic—16 percent higher than two years ago. Also affecting our maintenance budget is the demand for more and better services provided by this Department, Nevadans as well as tourists wanting road-sides that are kept clear of unsightly debris and equipped with frequent parking and picnicking facilities. These expensive services we have been glad to provide. However, our clean-up operation alone cost us more than half a million dollars during the last biennium in spite of our well

publicized anti-litterbug campaign. The tremendous expense of this clean-up operation would suggest, we think, that more stringent enforcement measures be taken against litterbugs, such as have effectively been applied in several of our neighboring states. Snow removal, another aspect of our maintenance program, is also a big item. Cost of keeping the deep snow portions of the Mt. Rose ski highway open last year, for example, was over \$5,600 per mile.

Such growth and progress in the past two years appears less significant when we consider the job ahead. When President Eisenhower signed the new Federal-Aid Highway Act which went into effect July 1, 1956, he signalled the beginning of the greatest road building program ever undertaken. The new bill will give this country 41,000 miles of 4-lane, limited-access highways, the safest and fastest which can be designed. This huge interstate system will connect 90 percent of our cities of 50,000 population or larger and will extend from border to border and coast to coast. Cost of the program will run some \$38 billion in Federal funds plus \$12 or \$13 billion in matching state money. For Nevada, \$12 million has been allotted in Federal funds for expenditure during the first year of the program with \$37 million to be available during the coming two-year period. As it affects us, the Interstate system embraces 544 miles of highway through Nevada on U. S. 40 and U. S. 91, these routes to be remodeled into modern, limited-access freeways.

In getting into this program, Nevada finds itself in much the same position as many other states; that is, our Highway Department is lacking in the manpower needed to complete the initial phases of the new program. Unable to obtain the necessary technicians, we have had to hire outside consultants to help us get started. Consulting engineering firms have completed aerial surveys of the Reno and Las Vegas areas to determine route locations and it is probable that other of the survey and design operations will be carried out by these or similar, well-qualified companies. Because we have been able to avail ourselves of the services of such private consultants and because we can allot a great share of the Federal-aid funds now available toward the purchase of rights-of-way and other preliminary phases, we are fairly well advanced into the interstate construction program in Nevada in spite of our manpower shortages. Fortunately we are not hampered by budgetary considerations at this time; however, considering the scope of the new Federal-aid program, there is a strong possibility that the State will be unable to provide matching funds for the entire \$75 million (of which \$50 million is for the interstate program alone) available to us over the next three years, unless future revenues increase.

Recommended for consideration during this Session is a revision and modification of our Nevada highway laws, some aspects of which, in their existing form, will delay and hinder our participation in the Federal-aid program. Recent national legislation pertaining to the Federal-aid bill calls for standards and policies greatly inconsistent with our present statutes. Like almost all other states have done or are doing, Nevada should modernize its highway codes if we are to take



Snow removal equipment keeps the Mt. Rose ski roads open.

full advantage of Federal participation in our own program. We propose, accordingly, to submit to this Legislature a revised draft of our highway statutes for consideration.

Along with modernized and workable highway legislation, we recommend that this Legislature authorize the establishment of a legal division within the Highway Department. The last Session provided an attorney from the Attorney General's office assigned to highway matters, thus greatly assisting us in handling our own legal problems. However, considering the heavier volume of this work as a result of our more complicated program, we now feel that a full-time attorney operating out of our own legal section is a necessity.

Thanks to action taken during the last Session, our immediate need for office space in Carson City will soon be met. By providing for the Highway Department to redeem \$330,000 in outstanding bonds on the State Office Building and authorizing construction of new offices for the agencies now sharing that building, the Legislature made it possible for us to become sole tenants of our present building next year. Thus, we will acquire room for our present operation. However, we



Before and After—U. S. 40 east of Reno is becoming a modern freeway.

suggest that the Legislature study our current and projected expansion with an eye to providing additional space as it will undoubtedly be needed within the next two or three years.

In our Reno division, we are still faced with a great lack of space for our shops and offices. It is hoped that the present Session will take steps to authorize construction on our present site or at a location to be designated.

In closing this section of our biennial report, we would be remiss in failing to express our appreciation for the several measures passed by the last Session which have greatly facilitated our operations. These include the authorization for the Department to establish local speed zones, and for right-of-way and access legislation pertinent to our freeway program.



*We
respectfully
submit here
a review of
the measures
which we hope
can be acted upon
by the
Legislature*

1. **PLANNING** for greater future revenues which will allow Nevada to match Federal funds provided under the new Federal-aid program.
2. **AUTHORIZATION** to establish a legal division within the Highway Department.
3. **ENACTMENT** of revised Highway Statutes which are being submitted for consideration.
4. **AUTHORIZATION** for construction of office and shop buildings in our Reno Division.
5. **STUDY** of our future office needs in Carson City with a view to providing more space than is available in the present building, as this will be required within the very near future.



Close teamwork between Highway engineers and crewmen keeps Nevada's roads in top shape. Above, shortage of space in the Department offices in Carson City has made it necessary to crowd these draftsmen into a former basement storage area. Below, a maintenance crew applies sealcoat and screenings.

PERSONNEL

The increased highway program for the biennium has brought many changes to the Department. Some branches, including the administrative and clerical, have remained more or less static, while others, such as engineering, have increased their personnel as much as 30 percent. In this category, 136 professional engineers were on the payroll at the close of the 1952-1954 biennium. Since that time, this figure has increased to 185. Five new survey crews, averaging six to eight men each, have been added to the already existing 17 crews, making a total of 22 operating throughout the State. Total personnel has increased from 751 in July, 1954, to 896 in June, 1956.

The new Federal road building program is already bringing increased demands for engineers, both professional and sub-professional. Because highway engineering requires specialized training, with a shortage of this type of personnel already existing, and because neighboring states will also be expanding their highway programs, a problem of securing qualified personnel is presented.

We are grateful to the State Personnel Department for their expansion and continued aid in securing qualified employees whenever possible. In several instances, where residents of Nevada were not available to fill vacancies in specialized fields, this Department was able to secure qualified applicants from other states who have since become valuable employees and residents of Nevada.

Salary increases made possible by the State Personnel Department and the 1956 Special Legislature offered not only encouragement to those already employed, but also served as an inducement to others to join the Department. However, in spite of these advantages, we are still confronted with a serious problem of recruiting competent and qualified personnel to adequately carry on the growing highway program. Office activities are hampered by lack of space, and expansion in the divisions needing more help is not presently practicable because the needed room is not available. The completion of the new State Office Building now under construction will alleviate this situation by furnishing space to those various state agencies now housed in the present State Office (Highway) Building, releasing the much-needed space to our own departments. This is another step forward in making it possible for us to increase our personnel for carrying out the expanding program.



The old and the new—photographed from the same location is a portion of the former highway (U. S. 40) west of Reno and the same section after it was turned into a modern, divided freeway. This safe, 4-lane route will, when completed, carry traffic across the entire width of the State.

PLANNING SURVEY

Importance of the Planning Survey from the national viewpoint is substantiated by the fact that it is supported by the Federal-Aid Highway Act in an amount of 1½ percent of the total apportionment to each state. State participation is on the same matching ratio as that for Federal-aid highway construction projects. The Nation's new highway program calls for alert and decisive action on the part of all state highway departments, and each Planning Survey must meet the necessary requirements.

Statistical studies and research by this Division provide data pertaining to all phases of the highway program. Developed from field surveys and research, these data are used at the national as well as the state level. Functions are considered in two groups: (1) continuing studies, and (2) special studies.

Continuing studies are carried out by various units within the Division as outlined in the following paragraphs. Until recent months, all special studies were assigned to units dealing with particular categories; now, in studies involving field work and detailed reports, a special study supervisor works out the procedure, supervises the project, assembles and analyzes the data, and prepares the final report.

Inventory

The purpose of the road inventory is to maintain a record of the alignment and surface type of the road-net and of roadside culture.

Throughout the biennium, two 2-man parties were assigned to road-logging and mapping control by second and third-order triangulation as compared to U. S. Coast and Geodetic Survey standards. Three trucks were used, all equipped with two-way radios, and two with gyro-compasses, odometers, and recording devices. Field notes were transcribed in the office and used for revision of state, county, and city maps. Gyro, mileage, and culture notes were coded for IBM punching and tabulating, and were used to obtain inventory and traffic statistics by mileage groupings on the several road systems.

Inventories were completed for Lander and Lincoln Counties, the eastern half of Churchill, the western part of Eureka, and the southwest corner of Elko County. Lincoln County is covered by planimetric mapping, and the new inventory notes were used as a check against the aerial photographs.

Field control surveys for checking certain aerial surveys by commercial concerns under contract to the Department are now under way in Elko, Eureka, Lyon, Storey, and Washoe Counties.



Reconstruction of Fifth Street, Las Vegas, eliminated two bad curves.

Mileage and cost study of the Federal-aid Secondary system was kept current, and strip maps and mileage tabulations compiled for route studies.

Street logs were completed for Carson City, Las Vegas, Reno, Sparks, and Yerington.

Following an established policy, we continued cooperative surveys with the U. S. Coast and Geodetic Survey and the Nevada State Fish and Game Commission. Each year of the biennium witnessed revision and publication of logs of the U. S. Routes, the Federal-aid Highway System, and the Federal-aid Secondary System.

Mapping

The Nation's new highway program demands careful long-range planning in all the states. Nevada, along with the others, has recognized the need for prompt action and the wisdom of applying aerial photogrammetric engineering to planning. Because Planning Survey has used photo-mosaics and topographic maps over a period of time, the Department's newly created photogrammetric department has been placed under its jurisdiction.

During the biennium, a revised Esmeralda County map was completed and was approved by the U. S. Bureau of Public Roads, and revised maps of Churchill, Lincoln, and Mineral Counties are in final stages of completion.

Two-color state traffic flow maps, one depicting 1954, the other 1955 traffic, were released, as were two-color traffic flow maps for Esmeralda County and for the cities of Fallon and Hawthorne.

Two-color Federal-aid and Federal-aid Secondary system maps were issued, and a revised control section map and a traffic counting-station map were completed.

In addition to routine mapping, countless sketches and graphs were prepared for other divisions of the Department. The official state road map was widely distributed each year of the biennium.

Traffic

Perhaps the most reliable single criterion to guide the highway engineer and planner in route selection and construction standards is volume and type of traffic encountered.

Planning Survey maintained fixed automatic traffic recorders at 22 key sites throughout the State. One new site was added on State Route 27, the Mount Rose road. Tape recordings from these fixed-location recorders were tabulated in the office and used to extend shorter-period counts and for estimating traffic trends.

During the 1952-1954 biennium, a camera-type fixed recorder, similar to those in use in New Mexico and Texas, was developed by personnel of the Division. This machine was installed as a pilot model at a site north of Carson City. Continued testing proved the recorder's durability, and established an extremely low maintenance factor. Two additional machines of similar design were built and are in operation on the divided highway on U. S. 40 east of Sparks. Present plans call for construction and installation of at least seven additional camera-type recorders to replace continuous traffic-counting models now in use in northern and central Nevada. Complete construction and installation costs are far below those of commercial units.

Statewide traffic counts were obtained with small portable traffic counters on all primary and secondary roads as well as on major state routes. Two men were employed on the field work which involved 85 portable recorders. From these counts of one-week duration obtained at different seasons of the year, annual statistics are compiled for every major section of state-interest road. The data are published in a report entitled "Annual Traffic Report—Nevada Highways." Another annual traffic publication of primary importance is the "Tabulation of Annual Traffic Census." This summary, much in demand, carries statistics on the July traffic census for the past 10 years.

Financial

Road inventory and traffic surveys present part of the picture needed for highway administration, but it is not complete without the economic information developed in our Financial Section.

This section is concerned with fiscal, road-life and statistical studies. The local fiscal study shows the status of county and municipal road and street receipts, disbursements, and debts. During the biennium the study was extended to include the financial aspects of subsidiary street functions such as street lighting, storm sewers, parking meters, and off-street parking. A study commenced during the previous biennium deals with the total highway fiscal structure. Now developed over a four-year period, the study has made possible a clear-cut accounting of the highway investment in each county by all participating agencies of the government.

The Road Life unit is concerned with cost studies, physical aspects, and life expectancy of state-interest roads. Taken into consideration by the unit are data on length, width, surface type, date of construction, improvement and retirement records, and cost figures. These analyses

permit reliable determination of standards and estimates of cost for future reconstruction mileages.

The road-life and cost study of the entire length of U. S. 395 in Nevada commenced during the 1952-1954 biennium, is still under way. Road-life (RL-7) graphs were completed. New road-life graphs for U. S. 40 were accomplished from final alignment records, and tie sheets were prepared from construction contracts completed. The same process is under way for U. S. 50. All roadlife graphs were kept current. Federal-aid, state and local mileage data, an annual requirement of the U. S. Bureau of Public Roads, were compiled each year.

The statistical unit continued its studies of state and local mileages, highway costs, and road-user revenues. A new compilation developed during the biennium deals with an explanation of sources of revenue for road purposes accruing to the Department, and to the counties and cities of the State.

Research branched into the related fields of weight and axle classification of common carriers and vehicle-mile and pro-rata vehicle tax. Regular monthly tables and graphs on motor vehicle registration and revenue, and on motor fuel consumption and revenue were continued. Publications included: (1) Study of Laws and Procedures Regulating Taxation of Motor Vehicles in Nevada; and (2) Legal citations and brief outlines of laws governing sources of revenue accruing to the State Highway Department, counties, and cities for road purposes only.

Special Studies

1. Cooperative Truck and Bus License and Registration Study (August and September 1954)—A cooperative study—Planning Survey and the Nevada Public Service Commission.

Data were gathered by interviews in the field, and assembled in the office for use in connection with a truck and bus reciprocity agreement under consideration by this State and California officials.

2. Reno Parking Study Reinventorv (December 1954 and January 1955)—A study emanating from a request of the U. S. Bureau of Public Roads for factual information on progress being made by the city of Reno toward providing additional off-street parking facilities recommended in our report on the Reno Parking Study of 1950.

The report on the current study carried a summary of the recommendations growing out of the original study and the city's accomplishments with regard to each. It also contained a summary table of parking places available in the central business district of Reno.

This supplement to the report on the original Reno Parking Study is available for distribution.

3. Las Vegas Truck Origin and Destination Study (January and February 1955) — A cooperative financial-participation project of the State, Clark County, the city of Las Vegas, and the Nevada Motor Transport Association.

Data were gathered by interviews in the field for the purpose of determining volume of truck travel to and from the Las Vegas area and the origin and destination of each truck. The objective was to determine the feasibility of constructing a truck circumferential route to by-pass greater Las Vegas and the effect that such construction would have upon the trucker. The report is available for distribution.

4. Reno-Sparks Origin and Destination Study (May 1955 to June 1956); Las Vegas Origin and Destination Study (July 1955 to June 1956)—Information as to where, when, and how people travel is essential to planning for improvement of streets and highways; truck travel is an important factor that must be included.

Factual data were gathered through sampled home interviews with individual families and through external cordon interviews. The findings from the two studies have been tabulated to the extent necessary to permit preliminary analyses by private engineering firms under contract to the Department in connection with studies of freeway routings through the Reno-Sparks and the Las Vegas areas. Formal reports will be compiled.

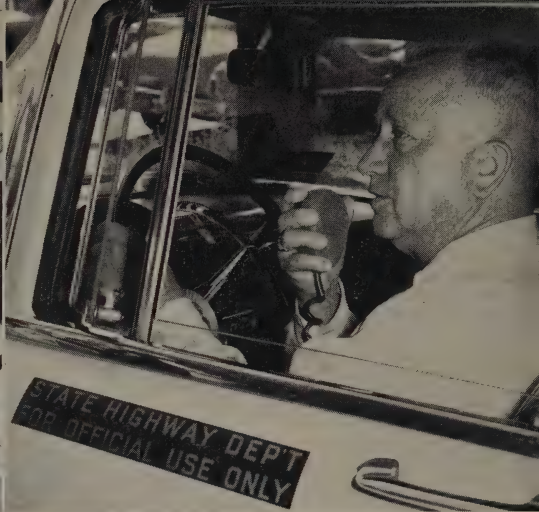
The earthquake of December 16, 1954, centered in the Dixie Valley and Fairview Peak area, Churchill County, caused considerable displacement of a section of U. S. Highway 50 where it crosses the south end of the valley. A study was made to determine just what had happened. Level lines were run for approximately 22 miles, and a report and log were prepared. Numerous geologists requested copies.

One of the provisions of the Federal-Aid Highway Act of 1954 vested in the Secretary of Commerce responsibility for the continuing study of all phases of highway financing, including the costs for completing the several systems of highways. In turn, the Secretary of Commerce made procurement of data and estimates from the states the responsibility of the U. S. Bureau of Public Roads. Compilations involved in Nevada's participation in this nationwide study were accomplished in our office Inventory unit. This has been known as the "Needs Study."

Among the other continuing special studies were the annual July traffic census; the highway maintenance and cost study conducted at eleven selected sites for the purpose of determining progression of deterioration and cost of maintenance; intersection and turning movement studies conducted in cooperation with the Department's traffic engineering section; speed check and car occupancy studies; and truck-weighting studies for 1954 (omitted in 1955 because urgency of other activities made it impossible to assign personnel to the project).

Main Street, 4 lanes wide, between Las Vegas and North Las Vegas.





COMMUNICATIONS

Highway Department radio has been in use for about three years in Nevada and is approaching the goal of a statewide system as originally planned. Initially, a partial radio coverage survey has been made to determine suitable locations for mountain-top repeater stations in the Reno-Carson area. This would provide extended coverage in Division Two and be the first step in setting up a radio link to Elko. This is now a reality.

Since the early part of 1953, additional radio surveys have been conducted, not only to determine local division coverage, but with the ultimate purpose of providing inter-divisional communications. The addition of a mountain-top repeater greatly extends the radio coverage from a division office and gives mobile units the opportunity to remain in communication with their office for far greater distances. This considerably reduces travel time for division engineers and maintenance employees in coordinating many activities at widely separated locations. Radio is particularly valuable in event of equipment breakdown in isolated areas and during snow removal operations.

At the time this report goes to press, the radio communications system in the State is as follows:

Each of the five divisions has a base station for communications within the division and ten maintenance stations are radio-equipped. Four mountain-top repeater stations are now in use with three additional expected to be completed by the end of the year. Approximately 200 mobile units are now in use, being installed in cars for supervisory

personnel, pickup trucks for maintenance foremen and mechanics, dump trucks for road repair crews, snow plows for winter use, and various vehicles for the Planning and Survey Departments. Provisions have been made to a limited extent, to provide interchangeability between summer and winter vehicles to prevent idleness of radio units.

It is now possible to inter-communicate between Reno-Carson and Tonopah, and between Reno-Carson and Elko. It is hoped that by winter Ely and Las Vegas will have radio communication to Carson City headquarters. This will enable Carson City to both receive and transmit road conditions to these areas rather than by teletype as in the past and will speed up transfer of this information. Since one ultimate goal of the Communications Division is to provide up-to-the-minute road condition reports for the State and those portions of highways adjacent to our State in California, a complete radio system is a necessity. We note that during the past years highway traffic has been constantly increasing, making it extremely important to have road condition reports more often. Radio plays a very important part in providing the public with this information far more rapidly than was ever possible with any other system of communication. By providing section foremen's vehicles with radio it is possible to get up-to-the-minute reports of any road condition changes, traffic hazards, accidents, and other pertinent information that will affect the safety of the public on our highways.

The present radio communications system has been installed and maintained by four full-time technicians with complete service facilities at Reno, Las Vegas and Elko, and* with a shop and part-time technician at Ely. These technicians service a considerable populated or non-populated area by means of mobile radios and several mountain-top relay stations. Travel time between maintenance stations, mountain-tops and their base of operation is a deciding factor in the speed with which technicians are able to restore a mobile radio, a base station or a mountain-top to service. Each technician is flexible in his assignment in that he may be called upon to assist another technician in a different division during the periods of heavy workloads or installations. By providing fully equipped service cars for the technicians they are prepared to handle nearly any emergency with the parts and equipment they normally carry in stock.

Radio has very definitely proven itself to be an extremely valuable tool in all phases of highway maintenance work, and the actual dollar savings based upon man-hours saved, speed-up of breakdown difficulties, snow removal, administrative information, and general exchange of information cannot be overestimated.

The installation, maintenance, and over-all performance of the highway radio system is the responsibility of the Communications Supervisor with offices in Carson City, which is also the collection point for the exchange of road information for the entire State of Nevada and the highway offices at Sacramento.

RECONNAISSANCE AND SURVEYS

During the past biennium the Reconnaissance and Survey Division has been increased to two location engineers and five full-time survey parties of six to seven men each. With the increase in Federal funds for highway construction it has become more difficult to keep the location survey work advanced so as to avoid delays in the highway design and construction program. This survey work has been considerably supplemented by the use of construction engineering personnel on location surveys during the winter months when highway construction work is curtailed due to seasonal conditions.

Although, as in the past bienniums, survey work was performed in practically all of the State's 17 counties, highest priority has been given projects on the basis of these considerations: Deterioration because of age, lower original construction standards, increased traffic load, or, in many cases, because maintenance costs are so high that reconstruction cannot longer be delayed. Thus, while more work may be accomplished in one area during any single biennium, total construction over a longer period affects all areas equally.

As in the previous biennium, surveys on Secondary highway projects during the past two years have exceeded, in mileage, the surveys on Primary highway routes and the more recently designated Interstate routes. This is accounted for by the fact that Secondary highways are usually constructed to lower standards, thereby permitting greater construction mileage with a like amount of funds as compared to Primary and Interstate projects.

At the time the Secondary Highway Program was first initiated, the various projects were designated as feeder roads, farm-to-market and mine-to-market road projects. However, these various road projects are now classified as the Federal-Aid Highway System and Federal Secondary funds are apportioned to the various counties in accordance with their Secondary highway needs. These projects are selected by the respective County Commissioners and approved by the Department and the U. S. Bureau of Public Roads before they become eligible for construction. Thus, with new projects being continually proposed and adopted, our Secondary road system is rapidly growing; on the other hand our Primary system changes very little. In Nevada two routes have been designated as portions of the U. S. Interstate highway system—U. S. 40 and U. S. 91. These two routes comprise a total of 544 miles as compared to 2,196 miles on the Primary system and 2,421 miles on the Secondary.

During the past biennium 593.60 miles of location surveys were completed at an average cost of \$1,161.78 per mile. This is an increase of

29.5 percent in mileage surveyed, and 20 percent in cost per mile over the previous biennial period. Of this total surveyed mileage, 332.7 miles, or 56 percent were on Secondary highway projects, while the remaining 260.9 miles, or 44 percent, were on Primary and Interstate projects.

Congress, late in June 1956, passed legislation for a 13-year expanded Federal-aid program for highway construction, which means that Nevada will have a greatly expanded highway program for several years to come. Reconstruction of U. S. 40 and U. S. 91 will conform to certain minimum standards as set up by the U. S. Bureau of Public Roads and the American Association of State Highway Officials. The principal factors involved include alignment, grades, roadway design, median and divided highway widths, rights-of-way, controlled access and traffic interchanges. In some instances, especially through urban areas, the selection of the most suitable routes would no doubt require several lines of surveys involving tremendous amounts of detailed work. Using our present available personnel, this work would require two to three years' time, possibly more, before rights of way could be acquired and design work completed so projects could actually be placed under construction. Meanwhile, of course, this same personnel would also be engaged in their continuing work on Primary and Secondary routes. Thus, since sufficient personnel cannot be obtained for both operations simultaneously, and as the Interstate program must be expedited as rapidly as possible, the Department has placed several of the more difficult projects under contract for aerial surveys. No doubt, other such contracts will follow.

Behind our decision to put this work in the hands of private contracting firms is the knowledge that in recent years aerial survey and photogrammetry have become the most modern and efficient means of securing the needed survey data. Aerial survey is widely used today for acquiring preliminary engineering data necessary to the Department for topographic study and tentative route selection.

During the latter part of this biennium four projects were placed under aerial survey contract, two in Washoe County and two in Clark. In Washoe County one project comprises a portion of U. S. 40 from the California-Nevada state line easterly through Reno and Sparks to Vista—a total length about 20 miles. The second project in Washoe County is a portion of U. S. 395 from about 15 miles south of Reno to about 12 miles north of Reno, a distance of some 27 miles. The two projects in Clark County include a portion of U. S. 91 from a few miles south of Las Vegas northeasterly through Las Vegas to Apex Summit, a distance of about 22 miles. The second project is a portion of U. S. 93 from Henderson through Las Vegas, a distance of about 17 miles.

The aerial survey on U. S. 395 will include ground control, vertical photography, planimetric and topographic maps, and other related work necessary to the acquisition of rights-of-way and design. On the other three projects the contracted work is principally for the selection of the most suitable freeway route through the respective areas. These

surveys will include, in addition to aerial photography, vehicular traffic studies showing origin and destination of traffic route recommendations, and the location of connections and crossovers of streets and other highway routes. When the most suitable route location is determined, the Department will be furnished with topographic maps and other data necessary to complete right-of-way acquisition and design.

Aerial survey work contracted for during the latter part of this past biennium comprises a total of 86 miles. The cost of this work runs from \$1,447 to \$4,565 per mile, depending on the size of the project and the information needed. Aerial surveys on the projects of this type are cheaper and furnish a great deal more information than could be had by the usual survey methods.

ROADWAY DESIGN

The function of the Design Division is to prepare plans, estimates and specifications for all construction and reconstruction projects undertaken by the Department. This includes, in addition to highways, the various projects necessary to modernize and expand the highway plant to provide facilities for administration and maintenance.

In preparing a set of plans for a project a vast amount of detailed work is involved in incorporating into the design all data necessary to meet the requirements of the Bureau of Public Roads and to provide contractors with all necessary information for the orderly construction of the work. This includes review of the location to determine that proper service will be rendered; reconnaissance and survey to establish alignment, grades, topography, etc.; a traffic count and study to determine the amounts and type of traffic that will use the facility; the preparation of project statement maps, sketch maps and other maps required by the Bureau of Public Roads for Federal-aid projects; the assembling of other supporting information to place the project on a program requesting the use of Federal funds.

After a project has been designated by the State for construction or reconstruction and the program approved by the Bureau of Public Roads, actual design is started. First step is to prepare preliminary plans showing alignment, a tentative grade line, pertinent topography and the required right-of-way widths. These preliminary plans are submitted to the Materials and Research Division for their use in sampling soils and developing borrow and gravel sources; to the Right-of-Way Division for securing the required rights-of-way; to the Bridge Division for bridge design, if necessary; and to the Construction Division for a field investigation to determine grade control, structure sizes and locations, swell or shrinkage factors, geometric design standards and other information. The findings of these specialized studies are then correlated by the Design Division and incorporated into the final design.

Design standards for a given project are in accordance with those set up by the American Association of State Highway Officials classified as: Interstate, Primary or Secondary. Standards are also controlled by the area, either rural or urban, and by the type and volume of traffic to be served. Through the efforts of AASHO, a design manual has been developed which sets forth the minimum requirements for the various systems. The important controls and recommendations in the design manual are based on the amount and character of traffic, and establishes the width and number of travel lanes, width of shoulders, horizontal alignment, gradient, sight distance, superelevation and easements on curves, design speeds, thickness of base and surface, width of median on divided highways, channelized intersections, grade separations, etc. The design standards used by Nevada are, generally,



Freeways mean progress in Nevada . . .

higher than the recommended minimum set forth in the AASHO design manual.

During the biennium the following projects were designed and placed under contract.

Number	Type	Cost	Mileage
25	Primary highway projects.....	\$10,291,255.00	207.096
24	Secondary highway projects.....	5,650,391.00	181.650
2	Interstate highway projects.....	1,646,153.00	8.035
1	Federal land highway project.....	427,751.00	2.741
1	Urban highway project.....	504,499.00	0.462
*4	State highway projects.....	432,670.00	29.365
*10	Maintenance stations.....	792,663.00
*1	Truck checking station.....	16,791.00
*1	Well drilling project.....	1,050.00
69		<hr/> \$19,763,223.00	<hr/> 429.349

*Financed entirely with state funds.



... here, a portion of U. S. 40 west of Reno.

An average of 83 employees was assigned to the Design Division during the biennium, including supervisors, designers, specification writers, assistant designers, draftsmen, computers and engineering aides in the main Design Division, as well as two assigned to the engineering files, and five assigned to the reproduction division. A 50 percent increase in the design personnel has been noted during the last biennium. This was accomplished by establishing a separate Secondary road design section in a converted basement storage area. No further expansion is possible until additional space is available. In general, the expansion has been accomplished by promotion within the organization and filling the lower bracket positions with sub-professional employees and trainees.

Design continues to become more and more complicated as traffic increases necessitate the construction of channelized intersections, grade separations, multiple lane facilities, lighting and signal facilities, control of access, frontage roads, etc. The cost of preparing plans, estimates and specifications was approximately $3\frac{1}{2}$ percent of the total construction budget during the biennium.



The record floods of December, 1955 brought hundreds of thousands of dollars in damage to the highways in western Nevada. Carrying 30,000 feet per second of flood water, the Carson River swept away several bridges such as this one near Gardnerville. Highway crews installed temporary replacements within a few days after the floods.

BRIDGES

The construction of bridges and grade separation structures during this two-year period has been more extensive than before with 20 bridges completed as compared to 12 for the previous biennium. A cost increase is also indicated. Based on estimates for projects not yet completed and final costs for completed projects, the total expenditure was \$926,500, compared to \$276,470.

Clark County received nine of the new bridges. Five of these were on the new Secondary highway from U. S. 91, 12 miles south of Las Vegas to Henderson. These were all small structures of the reinforced concrete box type. Three concrete bridges replaced the timber bridges on the Charleston Park road, the timber posts having been weakened by rotting near the ground line. The other Clark County bridge is one of our larger structures, being 246 feet long and costing \$133,000. This is over the Toquop Wash on the new location of U. S. 91 west of Mesquite.

Two bridges are under construction in Washoe County on the extension of Kietzke Lane from East 2nd Street in Reno to B Street in Sparks. One is the underpass in west Sparks, the only 4-lane underpass in the State. Estimated cost for this structure without roadway approaches is \$269,600. The bridge over the Truckee River is on a curve and a skew requiring a length of 328 feet, one of the longest in the State.

The Truckee River bridge was still under construction when the flood in December, 1955, washed out the temporary falsework and thus destroyed all of the completed superstructure. Although this flood was the greatest on record for Reno, it is very unlikely that any damage would have occurred to this bridge if it had been more nearly completed. A portion of the main beams had been poured with fresh concrete only the day before and, of course, did not have sufficient strength to resist the flood stress. Failure was caused by logs and other debris brought down by sudden high waters which powdered the falsework under the partly finished structure. Cost of removing the debris and rebuilding the bridge to its pre-flood stage is estimated to be \$126,000.

The flood of December, 1955, on the Carson River was of greater magnitude than that on the Truckee. The Carson River carried 30,000 cubic feet per second, which was 193 percent of, or nearly double, the previous high record of 1950, while the Truckee River carried 20,800 cubic feet per second or 105 percent of the previous high record of 1950. Destroyed by this Carson River flood were two bridges, one at Dayton and one at Gardnerville, with an estimated cost of replacement of \$250,000. In addition, approaches to three bridges in Douglas County were washed out. Finally, three county-owned bridges were destroyed, one in Douglas and two in Ormsby.

In Churchill County two bridges are under construction on McLean Lane, one over the Carson River and one over a Truckee-Carson Irrigation District canal.

In Pershing County the Humboldt River bridge northeast of Lovelock was rebuilt. The original bridge at this location was erected by the Department under Contract No. 1, in 1919 and 1920, and was widened in 1934. New construction in 1954 replaced the entire superstructure and widened the roadway to 40 feet.

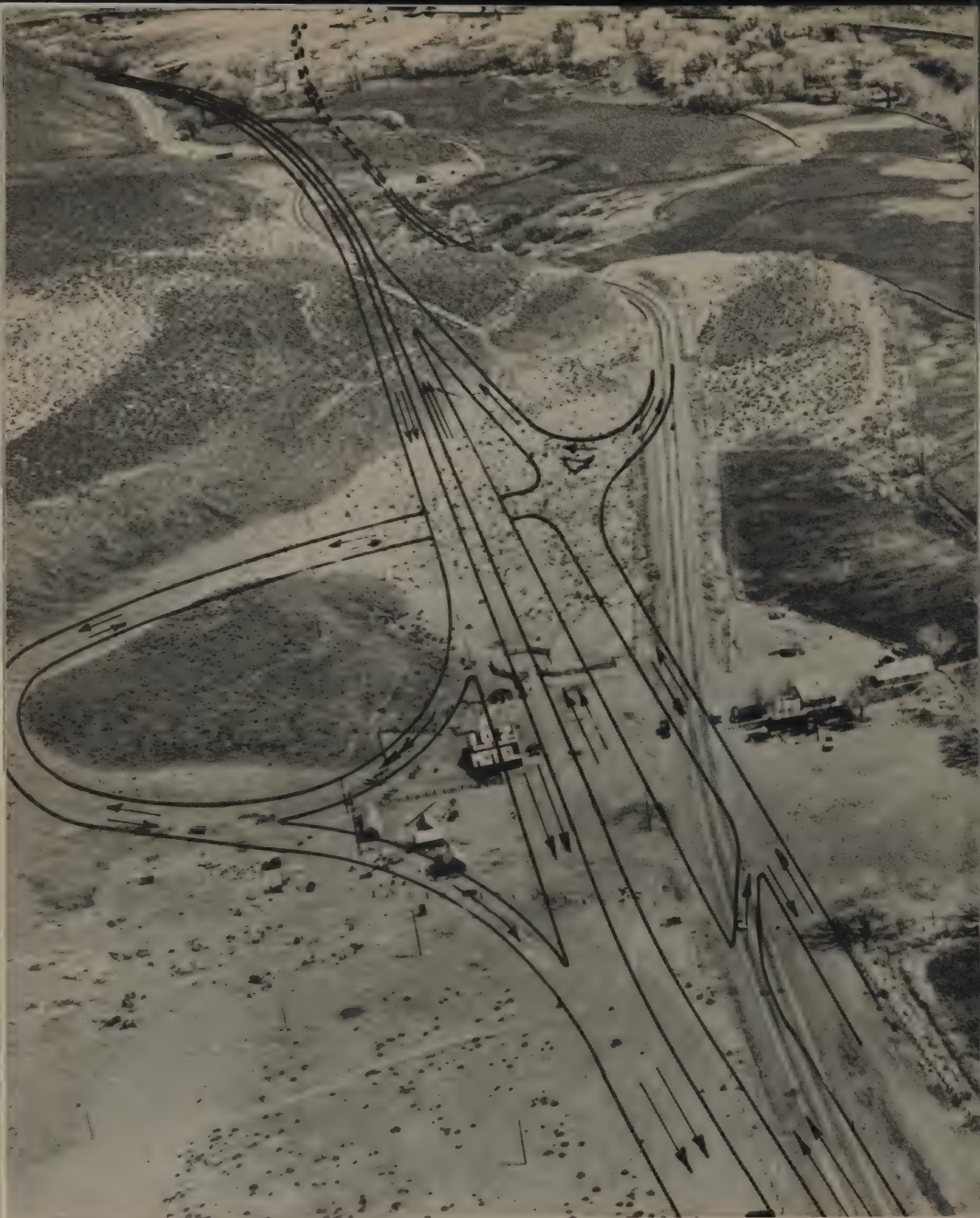
Other bridges of reinforced concrete box type were constructed or are under construction in Douglas, Elko, Eureka, and Lyon Counties.

Early in 1955, the Bridge Division increased its personnel by 50 percent. We had hoped to get some new University of Nevada graduates but those who were considering employment went elsewhere principally because of the lower salaries offered by this Department even after a 10 percent increase was granted. However, our need for personnel was considered so important that a few of the qualified men in other Divisions of the Department were transferred to this office.

Facing a greatly expanded program, we should further increase our personnel. This will be possible if salaries can be made sufficiently inviting.



The bridge at Dayton was another victim of the disastrous floods in December, 1955. Cost of replacing this and the Gardnerville bridge pictured on page 30 was about \$250,000. A number of county bridges on the Carson River were also destroyed.



Safer, faster roads for Nevada—this aerial view taken near the 102 Ranch on U. S. 40 about 20 miles east of Reno shows how the Highway Department proposes to extend the freeway in this area. Note the plan for the safe, well-designed intersection and approaches. Although right-of-way has not been fully acquired for this portion of the freeway, the design features have already been approved by the Bureau of Public Roads.

RIGHT OF WAY DIVISION

The Right-of-Way Division has as its responsibility the acquisition of all real properties that are required for highway purposes. These include rights-of-way, maintenance station sites, material sites, radio tower sites, roadside recreational sites, and last but not least, access rights. To accomplish all of these requires a study of the proposed highway design as it will affect property to be traversed, determination of ownership, preparation of maps and land descriptions, appraisals, preparation of agreements, deeds, and other legal documents, and, lastly, the negotiations for the needed property by right-of-way agents. Agreements for the adjustment of utility plants are prepared and completed by the Division personnel.

A rapidly expanding staff under the direction of the Right-of-Way Engineer is constantly at work in the performance of these never-ending tasks. At present there are seven right-of-way agents, one appraiser, one office engineer, six draftsmen, and one clerk-stenographer in the service of this Division. Because of the expanding highway program it is felt that before long it will be necessary to double that number of employees.

Of extreme importance during the period covered by this report is the initial acquisition by the Department of access rights along new projects involving major highways. A new Federal requirement is the control of access along all portions of the Interstate highway system. A six-mile-long project on the westerly slope of Pequops Summit in Elko County is being constructed to these new standards. Realizing the advantages to the motoring public of this type of highway and taking cognizance of the growing importance of U. S. 50, the Department acquired ample right-of-way for the forthcoming project along the Clear Creek grade in Ormsby and Douglas Counties, at the same time obtaining the control of access between the highway and the abutting properties. This new phase of right-of-way operations has been taken in stride and a pattern for the acquisition of access rights over public domain which has been acclaimed in other states has been established.

During the biennium the sum of \$388,657 was expended for land purchases, together with the sum of \$85,801 for adjustments and moving of improvements, and damages. These figures do not include salaries and expenses of personnel, court costs, fees, printing, office supplies or incidentals.



The largest contract in Highway Department history called for construction of an entirely realigned, 4-lane, limited-access highway along the Clear Creek grade on U. S. 50 to Lake Tahoe. Pictured here, the cleared right-of-way for the new route. Dotted line shows the future grade location.

Three condemnation suits were commenced in the courts and right of possession granted in all instances. It is possible that quite a number of cases will have to be instituted on several pending projects before right-of-way certifications will be in order.

To maintain the best of public relations, this Division through its agents spares no effort to make friends for the Department through fair, courteous, and impartial treatment of affected property owners. Members of this Division have appeared at various public and private meetings to discuss highway requirements and right-of-way features.

Nine people of this division are members of Sacramento Club Affiliate, Chapter 2, of the American Right-of-Way Association. Considering the distance, attendance at meetings in Sacramento and San Francisco has been good. The June 1956 meeting of this affiliate was sponsored by the members from this Division in Carson City and received publicity in the Association's national publication. Membership in this national organization is educational in nature and has given a broader understanding of the scope of right-of-way work.

The services and advice of the attorney assigned to the Department has increased the efficiency of the Division. It is believed that even more help along these lines is highly in order.

Since the Department has recently begun to request Federal funds to cover the costs for rights-of-way, competent appraisals will be required to substantiate all claims to the Bureau of Public Roads. The need for qualified land appraisers is becoming more and more apparent. When the freeway locations in the urban areas of Reno and Las Vegas have been determined together with the right-of-way requirements along the many miles of U. S. 40 and U. S. 91 to be constructed to interstate standards, the need for appraisers will be even more acute.

Of extreme importance is the necessity for more working space in order that the Right-of-Way Division may continue to operate in an efficient manner.

Another view of the rugged terrain where the new Clear Creek highway will be built. The contract calls for the biggest fill on any road in the Nevada system. This is also the first project (apart from the Interstate system) for which the Department has established access control.





MATERIALS TESTING AND RESEARCH

The Materials and Research Division of the Department is essentially a service organization. It serves the Divisions of Design, Construction and Maintenance in all phases of testing and inspecting materials used in construction and maintenance of highways. It also maintains close liaison with Right-of-Way, Bridge, Planning, Traffic and Safety and Accounting Divisions as frequent contacts with all of them are necessary in order to carry on operations smoothly and efficiently.

By far the greatest amount of these testing and inspection services are in connection with construction. Of the 13,763 samples of various materials tested in the Headquarters Laboratory during the past biennium, about 8,500, or better than 60 percent, were directly connected with highway construction. Of the materials going into the construction of highways and highway structures, the Materials Division is directly responsible for testing, inspecting and acceptance of all those manufactured or processed off the job site. Responsibility for tests and inspection of materials processed on the job site, such as base, surface and concrete aggregates, lies with the Resident Engineer. The job

inspectors and testers work directly under him. Nevertheless, the Headquarters Laboratory shares the responsibility for field tests and inspection indirectly. Frequent trips are made from Headquarters to supervise some of the work, particularly that having to do with construction of plantmix surfaces, roadmix surfaces and major concrete structures. The Headquarters Laboratory also is responsible for equipping the field laboratories, for setting up field test procedures and for training field personnel. During a normal construction season, from 15 to 25 field laboratories are maintained for control of the quality of job-processed materials, and from 15,000 to 25,000 such field control tests were made. These tests consist of compaction and moisture tests on embankment, sieve analyses and Atterberg limits on various base and surfacing materials and sieve analyses on concrete aggregates and screenings. These field tests are not included in the tabulation of tests which follow.

The Materials and Research Division serves the Design Division by exploring and evaluating subgrades, foundations and embankment materials and aggregates for base and surface course and concrete.

Field exploratory work is under direction of a senior civil engineer and a crew of three or more men skilled in the operation of mechanical equipment. Subgrades and foundations are explored by means of a truck-mounted auger and a mobile mounted drill. Gravel deposits are explored by two truck-mounted back hoes. Carefully taken samples of the various soils and aggregates are sent to the Headquarters Laboratory where appropriate tests are made and the data analyzed to evaluate the materials for design purposes. Samples and tests directly connected with the Department of Design compose about 23 percent of the total.

A minor, but important part of the work done by the Laboratory has to do with maintenance. The five Division Engineers depend upon the Laboratory for approval and evaluation of materials, such as aggregates, asphalts and other products used in repairing worn or damaged highways and appurtenances and in the construction of maintenance housing and other buildings. This work represents 5 to 7 percent of the total done by the Headquarters Laboratory.

From 10 to 12 percent of the samples tested are from miscellaneous sources. Since no commercial laboratories for testing structural material are available in western and northern Nevada, a number of Governmental agencies, state, county and city agencies and others, are permitted to have a limited amount of testing done in the Highway Laboratory. A nominal charge is made for this service. Considerable of this work is done for Federal agencies, such as the U. S. Bureau of Public Roads, the U. S. Navy, U. S. Engineers, U. S. Indian Service and U. S. Grazing Service. The State Planning Board, for example, designates the Highway Department Laboratory as the official laboratory for designing concrete mixes and testing structural materials, such as concrete, structural steel, reinforcing steel and masonry blocks for State buildings under its jurisdiction.

In addition to performing tests and inspections as outlined, this department, as much as necessity demands and time will permit, carries on research projects to aid in the discovery of reasons and remedies for road failures and to improve construction materials and testing practice. Other miscellaneous duties include serving on committees of the Materials Section of the American Association of State Highway Officials, Highway Research Board, attending conferences of a technical nature and acting as the official Carson City volunteer observer for the U. S. Weather Bureau.

Tests run in Headquarters Laboratory...

Type of test	Number of tests
<i>Concrete Materials</i>	
Portland cement.....	129
Coarse aggregate.....	227
Fine aggregate.....	237
Water for concrete.....	1
Concrete cylinders (from field).....	2,411
Concrete cylinders (4x8 lab.).....	380
Curing and waterproofing compounds.....	18
Expansion joint filler.....	15
Concrete pipe for percent of absorption.....	14
Rock for grouted rip rap.....	22
Concrete building block (compressive strength).....	127
Concrete building block, percent absorption.....	42
Concrete beams, compressive strength.....	11
Concrete beams, flexural strength.....	26
Concrete pipe, compressive strength.....	5
<i>Gravel Base, Gravel Surface and Fill Materials, Other Than Soils</i>	
Gravel base and surface (preliminary or pit samples).....	950
Gravel base and surface (finished product).....	455
Screenings and chips for seal coat.....	59
Slag and cinders.....	7
Selected borrow.....	169
Drain backfill.....	12
<i>Soils</i>	
Subgrade samples.....	1,913
<i>Metallic Materials</i>	
Corrugated metal culvert pipe.....	1,435
Mesh Reinforcing.....	23
Barbed wire.....	32
Wire fencing.....	76
Reinforcing steel.....	275
Structural steel.....	84
<i>Bituminous Materials</i>	
Liquid asphalt MC-1.....	230
MC-2.....	241
MC-3.....	64

Several new pieces of equipment for the Material Survey Crew and new equipment for the Testing Laboratory were obtained during the biennium. Principal addition to the equipment for the Material Survey Crew was a new mobile drill truck-mounted and equipped with numerous accessories. Laboratory equipment purchased consisted of a new Pensky-Martens flash tester, electric hot plates, high temperature viscosimeter and several new balances. Also, the laboratory developed and helped build a special cold temperature bath for running certain asphalt tests.

... at Carson City—Fiscal Years 1955-1956

Type of test	Number of tests
Liquid asphalt MC-4.....	2
SC-2.....	18
SC-3.....	596
SC-4.....	383
Penetration grade asphalt 85-100.....	215
100-120.....	1
120-150.....	1,546
150-200.....	95
200-300.....	55
Emulsified asphalt high viscosity (RS-2).....	364
Mix (RS-1 and MS-1).....	55
Roofing.....	5
Bituminous treated aggregate for extraction test.....	464
(Roadmix and plantmix)	
<i>Miscellaneous and Special</i>	
Creosote and timber preservative.....	12
Paints.....	1
Miscellaneous unclassified special tests:	
Portland cement, complete analysis.....	6
Portland cement, alkali.....	8
Special (chemical).....	13
Grout absorption.....	1
6-in. molded water seal and stop.....	1
Lead plate.....	1
Copper flashing.....	2
Metal conduit.....	6
Fibre conduit.....	3
Membrane cloth (waterproofing).....	3
Fence materials:	
Tension rods.....	2
"T" line posts.....	1
Chain link fence.....	1
Stretcher bar.....	1
End posts.....	2
Drive posts.....	1
Galvanized pipe rail.....	5
Special tests to determine oil percentages for base and surface aggregates.....	209
Core drilling for checking densities of roadway surfacing.....	82

OFFICE ENGINEER

The office Engineer supervises the following phases of activity within the State Highway organization: The processing of highway contracts and lettings; prequalification of contractors for bidding on highway construction; issuance of transportation permits and occupancy of right-of-way permits; and issuance of job authorizations. In addition he is secretary to the Highway Board of Directors and performs various other activities of a general nature.

A summary of the principal activities of the Office Engineer and the functions of the individual sections is outlined under the following section headings:

Contract and Letting

When the Design Division completes the plans for any project and the necessary approval of such plans and provisions is secured, this office then proceeds to carry out the remaining steps leading to construction work. These steps consist of advertising the project and issuing notices to contractors and interested non-bidding concerns after the setting of a letting date; filing of plans and specifications with the various places of plan inspection and the preparation and distribution of bidding forms to interested bidders.

On the date established in the notices, bids are received and opened in the presence of the State Highway Board and the State Highway Engineer. This office then supervises the checking and tabulating of all bids and the determining of low bidders. Information for the Board action in awarding or rejecting of contracts on bids received is also prepared.

When the low bids are approved by the Board on state projects and by the Board and the Bureau of Public Roads on projects involving Federal funds, the contract and bond are prepared for execution by the contractor, bonding company, and the Board. When the contracts have been executed completely, this office prepares detailed estimates for the auditing of monthly statements in favor of the contractors and detailed estimates upon which the project agreements with the Bureau of Public Roads are based for projects involving Federal funds.

During the biennium 63 contracts were awarded at 47 lettings. The average number of bidders per individual contract was five.

Information relative to the miles of construction and reconstruction completed and under contract on the designated state highway system at the close of the biennium may be found under Table 10.

Prequalification of Contractors

The General Highway Law requires that all contractors wishing to bid on state highway contracts shall be prequalified by the Department on the basis of their financial condition and experience. Prequalification of contractors is determined by a prequalification board consisting of the State Highway Engineer, Assistant State Highway Engineer, Construction-Maintenance Engineer, Auditor, and the Office Engineer. The Office Engineer, as Secretary to the prequalification board, is responsible for all details in connection with the assembly and analyzing of data for presentation to the Board and the maintaining of records in connection therewith. Prequalification by the Board is in a maximum amount limiting the contractor's bidding capacity to a specific type of construction and in an amount equal to the prequalification amount less the amount of work under way by the contractor at the time of request for proposal.

The average number of contractors prequalified to bid on the various types of highway construction during the biennium was 66. This number has remained relatively constant.

The following tabulation indicates the number of contractors prequalified by the Department at the close of the biennium, arranged in brackets of bid ratings:

Prequalified Contractors*

Rating	No. of Contractors
\$5,000,000 and over.....	13
2,500,000 to \$5,000,000.....	9
1,500,000 to 2,500,000.....	11
1,000,000 to 1,500,000.....	7
500,000 to 1,000,000.....	12
250,000 to 500,000.....	9
100,000 to 250,000.....	3
up to 100,000.....	2

*Includes contractors not licensed by the State Contractors' License Board.

Permits

Operations under this heading are divided into two parts—Utility Permits for the occupancy and use of the highway right-of-way and Transportation Permits. This office is responsible for the preparing, issuing, distributing, and maintaining of records of all permits issued under the two categories.

In the regulation of public utilities desiring to use the right-of-way of the state highway system, permits for the same are issued by the

Office Engineer upon authority of the State Highway Engineer based on applications submitted by the public utility. Issuance of utility permits is based on recommendations by the Division Engineer and by the Engineer of Design. All permits are issued pursuant to regulations prescribed by the State Highway Engineer in accordance with Section 19 of the General Highway Law.

Permits Issued

During the biennium, the following number of permits were issued:

Telephone lines.....	101
Power lines.....	36
Gas pipelines.....	3
Sewer lines.....	22
Water pipelines.....	34
Curbs and approaches.....	41
Miscellaneous utilities.....	8
Total	245

Authority for the issuance of transportation permits for loads and vehicles exceeding legal limits is delegated to the State Highway Engineer pursuant to Chapter 154 of the 1951 Statutes.

Requests for transportation permits continue to increase and the number now issued exceeds 1,400 annually. The development of the mining industry and increased construction activity in the State account to some extent for the increases. Other contributing factors are the greater use of trucks and truck-trailer combinations to transport farm machinery, the hauling of materials of construction as well as construction equipment, and an increase in the movement of buildings.

The number of permits issued during the biennium for loads exceeding legal limits established by law amounted to 2,758. This number exceeds those issued for the preceding biennium by 346 permits.

Permits were issued for the following loads: Pipes, piling, timber, culverts, steel—39; farm equipment, boats, tanks, screens, bins, etc.—299; machines, scrapers, plows, drills—189; bulldozers, tractors, rollers, angledozers—1,315; shovels, cranes, backhoes—464; construction equipment, general—326; buildings—600; miscellaneous—247.

It is worthy of note that the only restrictions relative to over-legal loads and vehicles pertain to width and gross axle loading. There are no legal limitations as to length or height of vehicles or combination of vehicles operating on the highways of this State.

Authorizations

This office is responsible for assigning numbers to and gathering data, preparing, distributing and maintaining a record and file for all job authorizations. Such authorizations nominally cover the expenditure of funds in excess of \$1,000 and must be approved by the State Highway Engineer and the Board of Highway Directors.

During the biennium 100 job authorizations were issued, while a total of 140 were actually in effect during the period. Work covered under the authorizations included such diverse things as sealing, chipping and widening the roadway; constructing access roads; repairing cloud-burst damage; constructing drainage facilities; building radio relay stations; constructing minor buildings; repairing maintenance station sites; installing traffic control devices, highway lighting and railroad warning signals; fencing highway and installing guardrail; constructing cattle guards; constructing roadside parks; and conducting aerial photo surveys.

The following table indicates the number of authorizations issued to each division and the total expenditures covered by the authorization.

Authorizations Issued—by Divisions

Division	Number of authorizations	Total expenditures during biennium	Incomplete job authorization	Grand total
One	29	\$162,401.11	\$38,700.00	\$201,101.11
Two	28	131,805.64	21,250.00	153,055.64
Three	21	28,069.68	38,000.00	66,069.68
Four	18	71,310.68	8,500.00	79,810.68
Five	26	151,362.55	23,150.00	174,512.55
Headquarters	10	17,392.35	17,392.35
Equipment	8	16,419.01	16,419.01
Totals	140	*\$578,761.02	\$129,600.00	\$708,361.02

*Includes \$84,849.26 authorized during previous biennium, but expended during the biennium.

Secretary

The Office Engineer, as Secretary to the Board, is responsible for performing certain administrative details required in connection with the preparation, presentation, disposition, and record keeping of all matters presented to and acted upon by the Board.

During the biennium 91 regular meetings of the Board were held.



Pictured from the same vantage point, these views show the construction and completed highway at Mormon Mesa in Clark County. One of the largest projects yet undertaken by the Department, this beautiful new road was opened to traffic in 1955. In the top picture is seen some of the heavy equipment used in its construction.

CONSTRUCTION

During the biennium, 63 contracts were awarded covering the construction or reconstruction of 434.04 miles of road at an estimated cost of \$17,466,231. Of these 63 contracts, 35 were completed and covered 208.28 miles at a cost of \$7,669,987. Contracts under way but not completed by June 30, 1956, numbered 28 and covered 225.75 miles at an estimated cost of \$9,796,244.

In addition to the above, 18 contracts awarded prior to July 1, 1954 and covering 216.68 miles were completed during this biennium at a total cost of \$6,977,312.

Of the 63 contracts awarded in this biennium, two were for the construction of 5.47 miles of 4-lane highway in Washoe County at an estimated cost of \$1,030,000; 26 were for the construction of 255.04 miles of 2-lane plantmixed asphaltic surface; 18 were for the construction of 149.72 miles of 2-lane roadmixed surface; one was for 15.57 miles of surface treatment consisting of a heavy asphaltic sealcoat with rock screenings; one was for 8.23 miles of right-of-way clearing; one was for the installation of traffic signals; one was for the fencing of 6 miles of right-of-way; one was for the construction of a truck checking station in Clark County; one was for the construction of drainage structures near Henderson; and 11 were for the construction of highway maintenance buildings at Elko, East Ely, Eureka, Hawthorne, Battle Mountain, North Fork, Orovada, Quinn River, Bowers and on the Mt. Rose Road at a total cost of \$803,429, financed entirely with state funds.

Some of the larger of these 63 contracts specified as follows: Contract No. 905 for construction of 9.18 miles of 2-lane plantmixed surface on a 40-foot roadbed on U. S. 91 near Mesquite in Clark County at a cost of \$1,144,466; No. 954 for 5.55 miles on U. S. 40 on the west slope of Pequops Summit in Elko County, 3.56 miles of which is 4-lane and two miles is 2-lane, at a total estimated cost of \$1,065,000; No. 929 for 21.12 miles of 2-lane plantmixed surface on U. S. 95 north of Winnemucca in Humboldt County at an estimated cost of \$846,775; and No. 924 for the extension of Kietzke Lane from Second Street in Reno to U. S. 40 in Sparks including the construction of a 2-lane bridge across the Truckee River and a 4-lane underpass under the Southern Pacific tracks. The original contract amount of this job was \$647,000; however, due to the fact that an unexpected quantity of water was encountered in the excavation for the underpass, the cost will be increased by some \$56,000. Other added costs on this job resulted from the 1955 flood damage.

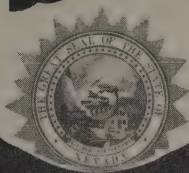
Other of the larger contracts for the period include: No. 910 for the construction of 5th Street from Oakey Boulevard in Las Vegas to Main Street in North Las Vegas, a distance of 2.98 miles, costing \$708,162; No. 944 for 17.65 miles on Alternate U. S. 50 south of Wenden in Elko County at an estimated cost of \$680,558; No. 945 for

11.18 miles of new road between Henderson and U. S. 91 in Clark County at an estimated cost of \$676,604; No. 949 for 24.39 miles of roadmixed surface on Route 25 from U. S. 93 at Crystal Springs to near the Tempiute mining district in Lincoln County at an estimated cost of \$658,262; No. 951 for 3.92 miles of 4-lane construction on U. S. 395 south of Reno costing an estimated \$580,000; No. 920 for 19.06 miles on U. S. 93 south of Wells in Elko County costing \$496,730; No. 934 for 13.26 miles on U. S. 50 in Eureka County at an estimated cost of \$490,000; No. 912 for 1.55 miles of 4-lane construction on U. S. 40 from Vine Street to the west city limits in Reno costing \$457,253; and No. 952 for 4.11 miles on U. S. 50 in White Pine County costing an estimated \$429,373.

In addition to the above projects, the following work was carried out by the United States Bureau of Public Roads: 15.65 miles of widening and resurfacing on Route 28 from the California state line to U. S. 50 along the east side of Lake Tahoe costing \$197,438; 5.07 miles of new construction in Lee Canyon in Clark County at an estimated cost of \$161,075; 0.63 mile on U. S. 50 in grading approaches for a new parallel tunnel at Cave Rock costing \$216,895; and 15.49 miles between Wadsworth and Nixon in Washoe County costing \$227,162. These projects were financed entirely by Federal funds although the State will pay all maintenance costs.

The disastrous floods of December, 1955 in western Nevada completely destroyed the concrete bridges over the Carson River at Gardnerville and Dayton, washed out a small drainage structure 5 miles east of Dayton on U. S. 50, and almost fully destroyed the bridge over the Truckee River on Kietzke Lane in Reno which was then under construction. Estimated cost of replacing the structures at Dayton and Gardnerville and the Kietzke Lane bridge at Reno is \$260,000. In addition to these bridge replacements, some \$86,000 in maintenance reserve funds as well as many thousands of dollars in regular maintenance funds were spent in reconstructing portions of the State highways destroyed or damaged by the floods.

*Welcome
to*
NEVADA



"RECREATION UNLIMITED"

Welcoming visitors to Nevada at all principal points of entry is this sign which is fully reflectorized and bears the State's colors.

TRAFFIC SIGNS

This Division, headed by the Traffic Engineer, is responsible for the production and placing of signs, traffic control devices, highway lighting and centerline striping on the improved State highway system.

All highway signs are manufactured in the Department's sign production shop located in Reno which during the past year has been enlarged and modernized to meet the demands anticipated from the new national highway program. Multiple-lane highways will need more and larger signs and our new facilities will enable us to continue the manufacturing of all signs. The method of producing our own signs, rather than purchasing, has proven its efficiency as special signs can be manufactured with minimum delay and at a considerable saving.

All signs are constructed in accordance with national standards, the majority being reflectorized. Approximately \$50,000 worth of new signs are being produced each year.

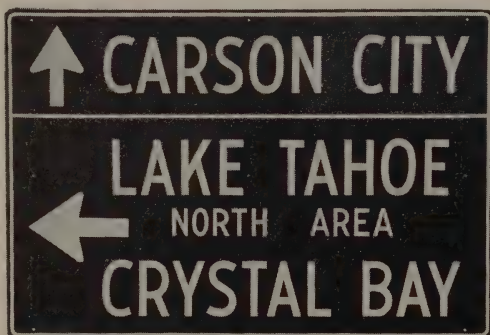
Realizing that the placing of a center stripe is a must for highway safety, the Department has increased its striping program so that 3,400

miles are now being striped annually, at a cost of about \$95,000. As has been done for many years in the past, ready mixed traffic paint is being purchased according to state specifications. All striping and pavement marking is done in accordance with standards recommended by the American Association of State Highway Officials.

During the past biennium, as a part of our general highway construction program, traffic signals were installed at five intersections where traffic volumes warranted, and mercury vapor lighting systems were erected at seven channelized intersections. The lighting and signal systems were designed by this Division, installed by the Department, and are maintained by the respective cities and counties.

In addition, traffic engineering services have been furnished to the majority of the cities of the State. Three traffic signal systems, to be installed by the cities, were approved by the Department following studies which indicated that the installations met all warrant requirements.

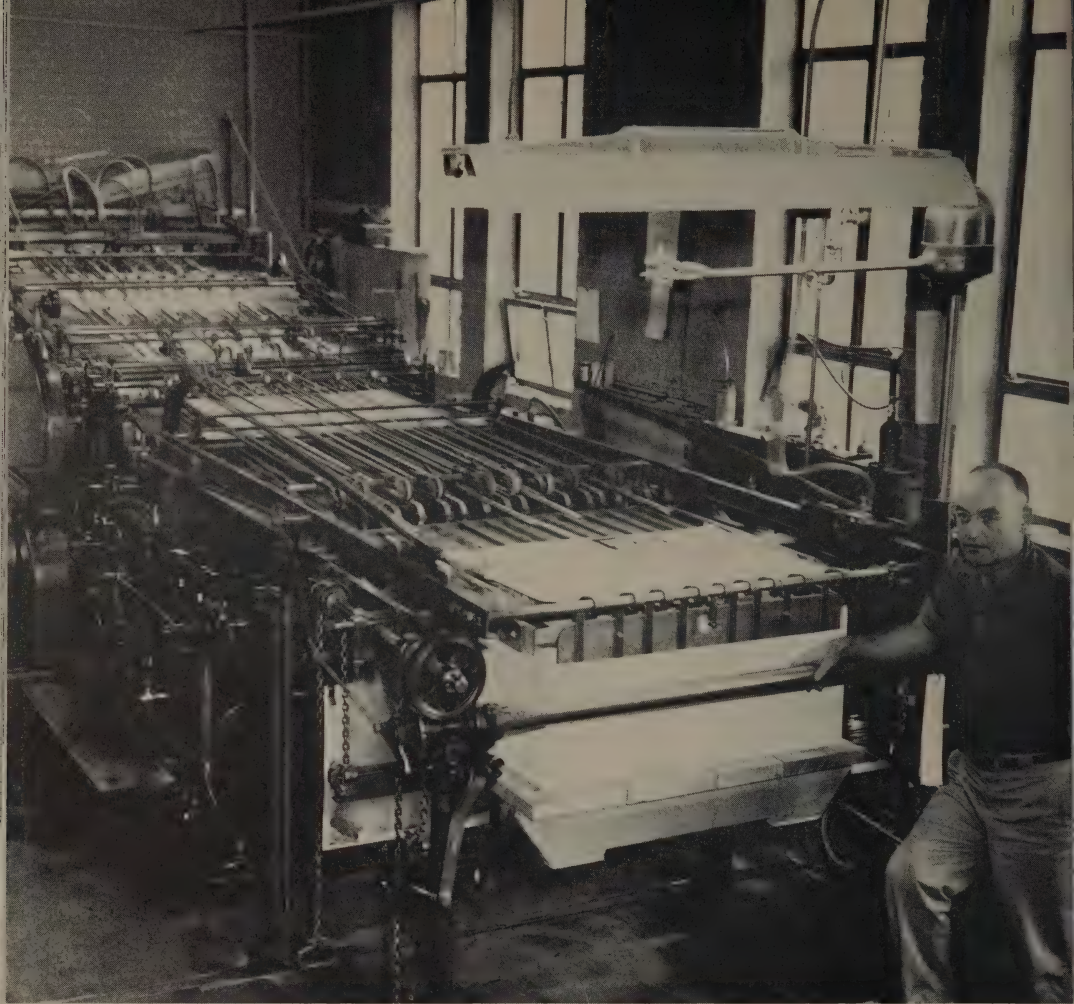
The 1955 Legislature passed a law giving the Department the authority to establish and sign speed zones on hazardous sections of the highway system. The implementation of the law, which required the gathering of factual information on speed and accident patterns, the type of traffic, the resulting recommendation for a speed limit, and finally the signing, is handled by this Division. Some 20 hazardous areas have been zoned and others are under study. The results have been gratifying in that the number of accidents has been reduced and traffic fatalities have been materially decreased.



The direction sign, left, is similar to many going up in other sections of the State and indicates the trend toward larger signs with clearer legends. The Division's new sign, right, is being erected along all sections of the State's highways which have been designated part of the limited access system.



The Traffic and Signs Division tried a new method of highway marking in Washoe Valley in 1956 which proved very successful, with shoulders as well as centerline of the highway marked in white. Greater safety resulted because the outer lines discouraged drivers from using the wide, single lanes for passing and because visibility is better under snow or fog conditions.



The big press at the State Printing Office is pictured here as it prints pages of the *Nevada Highways and Parks* magazine. The Highway mail room, below, sends out issues of the magazine to tourists.



“NEVADA HIGHWAYS AND PARKS” MAGAZINE

In addition to publishing the *Nevada Highways and Parks* magazine, this one-man division also performs various public relations functions for the Department. These include the handling of tourist correspondence, preparation of news releases, writing and technical supervision of information brochures and other Department publications, and the distribution of the official state map and similar material. A considerable portion of the editor's time is devoted to the several hundred tourist inquiries received by the Department each month. In this operation, he is greatly assisted by the receptionist and mail room staff. Addressing of the magazine and mailing of bulky material, as in years past, is done by stock room personnel.

During the biennium, four issues of the magazine were published, three under the editorship of Fred Greulich who retired late in 1955 after 20 years with the Department. During his tenure, the magazine grew from a small brochure to the colorful and popular publication it is today. Fifty thousand copies of each issue are now being printed, most of these going out of Nevada, particularly to California, New York and the midwestern states. A large share of subscribers on the permanent mailing list are schools, libraries and other such public institutions.

Effectiveness of the magazine was measured by a post-card survey of subscribers completed in 1956 which shows that each copy is read by an average of 10 people. According to the survey, thousands of these out-of-state readers had either visited or were planning to visit Nevada after seeing the magazine, which indicates its value in promoting the tourist industry. Effectiveness of the publication can be further increased by issuing it on a regular, seasonal schedule and by developing better distribution methods. These and other improvements are being planned by the editor.



Another view of the Mormon Mesa job (looking easterly) which cost over a million dollars. The relocation of this portion of U. S. 91 resulted in a shorter, safer route. Right, construction across a flat on the route between Empire and Gerlach.

MAINTENANCE FACILITIES

With the ever-increasing mileage of the highway system, the wider highways, multiple lanes, heavier loadings and greater traffic, highway maintenance is becoming a more vital operation.

During the biennium, a new division headquarters shop, an office building and storage structures were constructed at Elko, and a similar installation was nearing completion at Ely as the biennium ended.

A number of maintenance stations built in the Département's early days now require enlargement and modernization. Numerous storage and shop buildings constructed at that time will not accommodate the ponderous snow removal and maintenance equipment of today.

At North Fork, at Orovada, and at Battle Mountain existing facilities were enlarged by the construction of new shop and storage buildings of modern, fireproof design. At Bowers Mansion a new residence and additions to shop and storage buildings were completed.

New maintenance stations, including shop and storage facilities, residences, water supply and sewage disposal systems were constructed at Mount Rose, Indian Springs and Mountain Springs. Also completed during the biennium was a new station at Eureka.

Construction was begun near the close of the biennium on new maintenance depots at Hawthorne and at Quinn River, both projects scheduled for completion in October, 1956.

Contracts for maintenance structures completed during the biennium totaled \$814,969, an additional \$81,675 having been expended for similar facilities built by state forces.

Plans and specifications for maintenance facilities were prepared by two architect employees of the Design Division, these employees being responsible also for the planning of other highway structures, including several buildings housing radio relay equipment.





Greatly in need of modernization are these facilities in Reno shared by the Division Two Shop and Equipment Division. Most of the buildings pictured above are many years old, some dating from the 1920's. With the rapid growth of the Department in recent years, offices and shops in Reno are sadly outdated. Below, this huge piece of equipment is kept in top running condition by the Equipment Division for the strenuous task it fulfills in winter.



EQUIPMENT DIVISION

The Equipment Division, with headquarters in Reno and shops in Carson, Elko, Ely, Tonopah and Las Vegas, maintains 927 mobile units such as trucks, rotary snowplows and similar self-powered equipment. The Division also maintains 270 units classified as attachments or stationary, this category comprised of discs, bunkhouses, etc. Lastly, 112 pieces of miscellaneous equipment are maintained, including 21 diesel electric plants, 10 deep well pumps, 31 oil burning furnaces and 50 power-driven chainsaws of various types, striping machines and powered paint units.

Compared to the past biennium, the Division's fleet has increased by 132 mobile units and by 33 stationary units. In addition, many of the older units were replaced during the period to maintain a constant equilibrium of equipment in top running condition.

The new shops at Ely, Elko and Tonopah are well equipped for maintaining the large and growing fleet of the Department. Although 2,072 square feet of space was added to our Reno shops this biennium, more is needed. As in Las Vegas, the Reno shops have hopes of future shop expansion.

In the two-year period, the Division and the Traffic and Sign Division combined in constructing 900 square feet of space for manufacture of signs. Serving this facility, 230 feet of sewer line was installed.

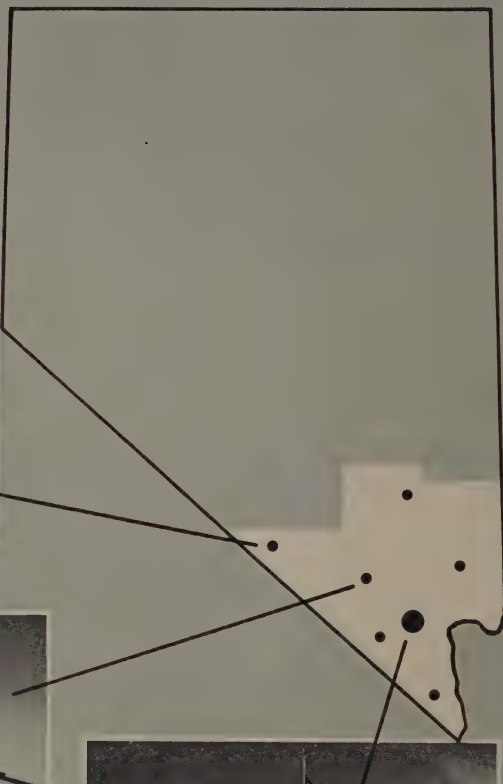
The Division also acquired operational space for maintenance men at the equipment headquarters. Throughout the State many new buildings have been constructed. These, consisting of maintenance stations and garages in isolated areas, are a boon to both the Maintenance and Equipment Divisions in handling and repairing equipment.

In all of the outlying Divisions in the State are spacious and well equipped shops and stock rooms where accurate records are kept of all parts and supplies received or disbursed. The perpetual inventory card system makes it possible to keep the necessary parts on hand for the seasonal operation of all types of equipment.

DIVISION ONE



New, well-equipped maintenance plants at Beatty and Indian Springs pictured here with the spacious Division buildings and green landscaped grounds at Las Vegas.



*Division
Headquarters*

LAS VEGAS

*Maintenance
Stations*

ALAMO

GLENDALE

BEATTY

INDIAN

SPRINGS

MOUNTAIN

SPRINGS

SEARCHLIGHT

Division One, with headquarters at Las Vegas, experienced a very busy and interesting period between July, 1954 and June, 1956. In this Division, 107.65 miles of highway were placed under construction. Most of this improvement was new due to change of locations, and was effected at a cost of \$4,291,573.

Two contracts are worthy of comment. Contract No. 905, awarded to Thorn Construction Company of Springville, Utah, calling for 9.18 miles southwest of Mesquite, was particularly challenging due to the roughness of the terrain and types of materials encountered. In one 90-foot cut, clay, sand and conglomerate, which required shooting, were encountered,

and benching of the cut was necessary. This contract called for new construction as the highway was relocated on the north side of the Virgin River, eliminating two river crossings, one at Riverside and one at Mesquite.

A second job of considerable interest was the reconstruction of Fifth Street through Las Vegas, Wells Cargo being the contractor. This contract, No. 910, called for an open graded bituminous mix to be placed over the old concrete pavement between Charleston Boulevard and Fremont Street. New construction into Pahrump Valley and Lee Canyon was also completed.

Under the category of new structures, an office building consisting of a large drafting room and four individual offices was erected by maintenance forces at the Las Vegas headquarters. Cost of this project was \$20,673.

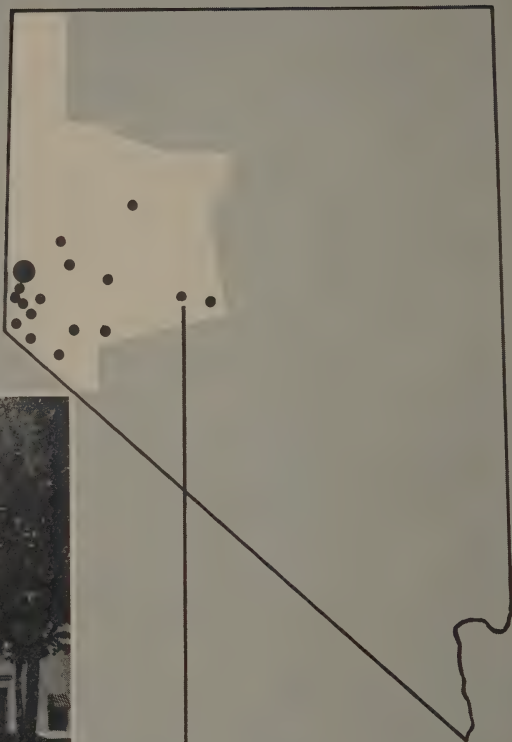
Anticipating the passage of an expanded Federal-aid bill by the 84th Congress, considerable study and planning were given to the location of a freeway on U. S. Highway 91 through Las Vegas. This work is now being conducted by a joint venture of two private engineering firms. In conjunction with this study, the same firms are also studying a proposed expressway between Las Vegas and Henderson.

Maintenance in Division One consisted of normal operations and the continued pavement widening process described in the last report.

This Division spent \$1,009,580 in all phases of maintenance operations with \$86,089 going for flood control work and repairing damage from cloudbursts. Cost of repair and cloudburst clean-up for the Charleston Boulevard underpass alone amounted to \$8,333. Betterment work in widening pavements amounted to \$116,042.

Maintenance operations, as well as other phases of highway work, were aided materially by the installation of mobile radios in approximately 26 units. Valuable time and an unlimited amount of mileage were saved by means of this improvement. A repeater station now under construction at Angel Peak will give much greater coverage and will add greatly to our facilities. This will also make it possible for Division One to contact other sections of the State by radio.

DIVISION TWO



Division Two has central offices in downtown Reno. The Eastgate maintenance building is typical of the smaller ones in the State.



*Division
Headquarters*

RENO

*Maintenance
Stations*

CARSON CITY
BOWERS
MANSION
GALENA CREEK
MT. ROSE
SPOONERS
GARDNERVILLE
VIRGINIA CITY
FERNLEY
YERINGTON
WELLINGTON
FALLON
EASTGATE
PETERSON
STATION
LOVELOCK
SCHURZ

Division Two, with headquarters in Reno, is responsible for a total of 1,005 miles of state maintained highways. During the biennium 22 contracts totaling \$6,761,000 for the construction or reconstruction of 209 miles of Interstate, Primary and Secondary routes were awarded.

Of these 22 contracts, two calling for construction on U. S. 40 were particularly important. A section of this route beginning 3 miles east of Sparks was 4-laned at a cost of \$1,191,000. West of Reno (beginning at Vine Street) similar construction was completed at a cost of \$441,000.

On U. S. 50 south of Fallon, a 13-mile stretch was completed at a cost of \$801,000; near Frenchman Station a 12-mile stretch was completed at a cost of \$183,000.

During the biennium, State Route 34 from Wadsworth to Nixon, a distance of 16 miles, was reconstructed by the Indian Service and has been taken over by the Department for maintenance.

Important to the Reno area was the extension of Kietzke Lane north, slightly over one mile, including a Truckee River bridge and underpass at the Southern Pacific tracks, the job costing \$647,000.

A number of feeder roads were being completed in Lyon, Churchill, Douglas, Washoe and Pershing Counties.

The Forest Service, under supervision of the Bureau of Public Roads, has constructed new approaches to the proposed new tunnel at Cave Rock, and has also widened and resurfaced State Route 28 from Spooners Junction north to the Nevada-California state line.

Maintenance station improvements during the past two years include construction of an additional residence and an addition to the storage garage at Bowers Mansion, and construction of a residence and storage garage on the Mt. Rose Road near Grass Lake. Additional tables and benches have been installed at roadside rest sites in the Lovelock area, and tables, benches, fireplaces and sanitary facilities have been provided at a roadside rest in Mills Park, Carson City.

Division Two was linked with other highway offices in the State by means of newly installed transmitters in Reno and Carson City and repeater stations on Mt. Davidson and Slide Mountain. Radio installations in vehicles and at several maintenance stations greatly improved communications within the Division.

DIVISION THREE

Elko is proud of its fine, modern offices and yard pictured here along with the original facilities long ago outmoded.



*Division
Headquarters*

ELKO

*Maintenance
Stations*

DEETH

WELLS

PEQUOPS

SUMMIT

CONTACT

NORTH FORK

BATTLE

MOUNTAIN

WINNEMUCCA

OROVADA

DENIO

QUINN RIVER

Division Three, with new headquarters in Elko, maintains 883 miles of highway in Humboldt County, and parts of Elko, Lander, Eureka and Pershing Counties. Within this area, the Division has 10 maintenance stations, each maintaining an average of 20 miles of road per man. The smallest station has two men; the largest outlying maintenance station has five men and is responsible for approximately 100 miles of road. During the biennium a total of 67 persons were employed in the Division.

In this period, the Department completed an attractive new Division office building which has been landscaped with lawn, trees and shrubbery. Also completed were a new repair shop of cinder block and concrete construction, a metal-roofed parking building with 50 open stalls, and a fireproof gas house in the center

of the yard with two gasoline pumps and one diesel pump, each served by 5,000-gallon storage tanks. An additional 8,000-gallon tank buried in the yard contains furnace oil needed for our repair shop. Other new facilities include a watchman's quarters near the front gate and a maintenance room from which crewmen are assigned to their day's duties. Outside the yard, the Department has taken advantage of the terrain to install road oil storage, making it possible for trucks and trailers to unload by gravity into two 10,000-gallon tanks.

During the biennium, 19 contracts in this Division were awarded by the Department, including three which called for additions to our maintenance stations at North Fork, Battle Mountain and Orovada. A new maintenance station is also being built 15 miles north of Quinn River Crossing on State Route 8A.

In the past two years the Division has built 57.97 miles of new roads costing \$3,099,764 or \$53,471 per mile. We have also contracted for reconstruction of 74.61 miles of highway at a cost of \$1,628,848 or \$21,830 per mile.

The first section of limited access roadway has been started in this Division on the west slope of Pequops Summit, about 6 miles long.

The Division has put down seal coat and chips on 30 miles of our Primary system during the biennium and reconditioned about 4 miles. Some 200 miles of road spread with light seal has been sanded.

Radios have been installed in several units of the Division and at Division headquarters, which has been very helpful during all of our operations. Under good reception conditions, we can contact our maintenance men west of Elko and at the North Fork station directly from headquarters offices; relay stations already installed at Winnemucca Mountain and at Emigrant Summit together with a third, being installed on Elko Mountain, will enable us to reach Contact and most of our eastern maintenance stations.

DIVISION FOUR

Good-looking new buildings in East Ely, shown here with a view of the old facilities, make work easier in Division Four.



*Division
Headquarters*

EAST ELY

*Maintenance
Stations*

SCHELLBOURNE

CURRY

FERGUSON
SPRINGS

ILLIPAH

EUREKA

CURRANT
CREEK

BAKER

GEYSER

PIOCHE

CALIENTE

Division Four of the Department with headquarters at East Ely is responsible for a total of 820.35 miles of the highway system.

During the biennium, eight contracts were awarded for the construction of roads in this Division and two contracts were awarded for the construction of an office building, shop, maintenance buildings, and storage facilities.

Among the important contracts on Primary routes was one calling for construction on U. S. 50 south of Wendover at a cost of \$680,958. On U. S. 50 a 12-mile section (beginning six miles west of Ely) was contracted for reconstruction at a cost of \$497,565.

Another job of interest in eastern Nevada called for construction of a road from U. S. 93 north of McGill to the Berry Creek Road, this leading into a popular recreational area.

In January of 1956, the Department contracted for the construction of new buildings at the East Ely headquarters. These consist of a new three-unit office building, a large engineering room, a maintenance building containing compartments for a sign shop, car paint shop, greasing room, carpenter shop, blacksmith shop, machine shop, two rooms for storage of parts and tires, and large repair and work room. Also constructed was a storage shed containing eight stalls and a new radio repair shop. Old storage sheds were to be moved to a better position on the lot.

Division Four carried on the general maintenance of 75.50 miles of gravel surface roads and 744.85 miles of asphalt surface roads during this biennium.

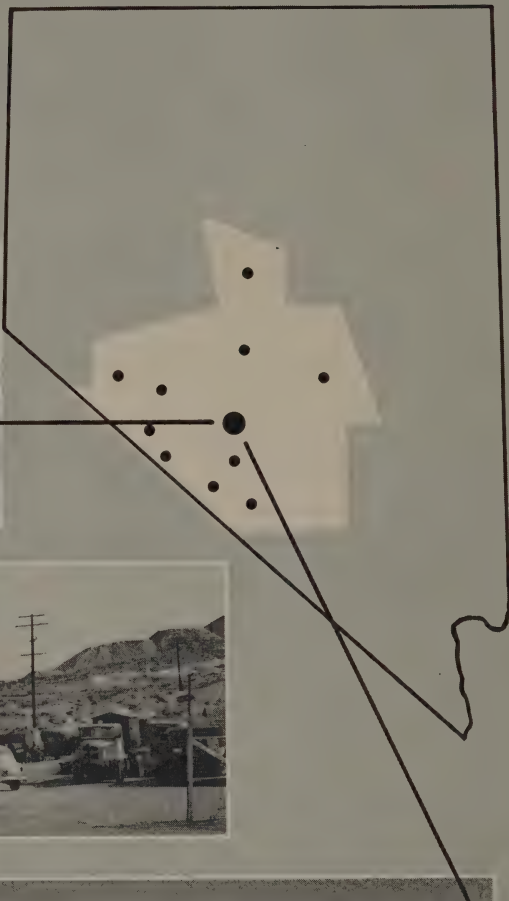
East Ely headquarters maintains a mechanical repair shop, a blacksmith shop, and a paint and sign shop. Major equipment repairs are completed in the East Ely shops, minor repairs being made in the field by mechanics from the East Ely shop.

Snowfall was comparatively light during the last two winters with a minimum of wind and drifting. Consequently, snow removal operations were light. Slick and icy roads due to light snowfall, thawing and freezing were a continuing problem, maintenance crews spending more time sanding icy roads than in removing snow.

During January, 1955, Division Four snowplow crews opened the roads into lower White River Valley and Garden Valley so that sheep and cattle snowed in on the winter range could be fed.

DIVISION FIVE

Tonopah's enlarged offices and yard are shown here in contrast to the inadequate plant which they replaced.



*Division
Headquarters*

TONOPAH

*Maintenance
Stations*

GOLDFIELD
SARCOBATUS
RATTLESNAKE
AUSTIN
FISH LAKE
VALLEY
BASALT
MINA
HAWTHORNE
CARVERS

Division Five with headquarters in Tonopah is responsible for construction and maintenance of 778 miles of state highway, with approximately 75 additional miles to be added shortly, from Warm Springs to Tempiute.

No highway contracts were under way during this biennium. A large part of the highways in this division are of pre-war roadmix construction and are substandard as to width and alignment for modern traffic; hence, there is a problem in keeping up the pavement edge and shoulders. Also, many miles of the roadmix pavements are heavily oxidized. Considerable second-story and widening of the existing pavement has been done by maintenance crews over the narrow and cracked sections of U. S. 95 west of Tonopah, and over the Warm

Springs Summit on U. S. 6. Better sections of these roads were flush-sealed and sanded.

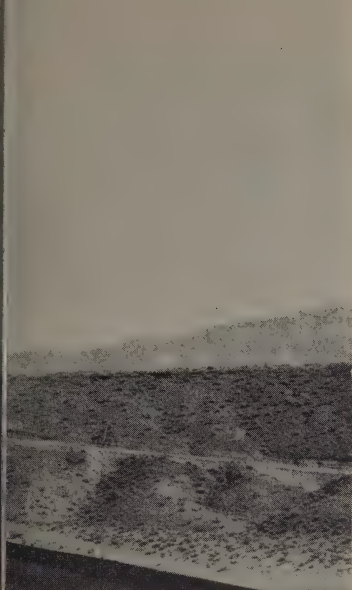
New equipment obtained in this biennium has made it possible to assign a motor patrol and a small oil distributor to each maintenance crew in the division. This has expedited shoulder maintenance, shoulder sealing and patching.

New equipment obtained includes 3 motor patrols, 3 small asphalt distributors, 3 pull brooms, 3 front end loaders, 2 shop pickups of which one is a replacement, 12 dump trucks of which 2 are four-wheel drive (all replacements), 2 pickups of which one is a replacement.

Radio has been installed in 21 mobile units, and a base station has been set up in the Tonopah office. It is hoped that with a mountain top installation on Mt. Oddie the division coverage will be nearly 100 percent. The radio is receiving more and more use as the men become familiar with it.

A modern maintenance station is being erected at Hawthorne at an estimated cost of \$58,000 to replace the substandard installation there. The heavy rains of December, 1955 did only nominal damage, and that was confined to the Basalt and Hawthorne areas. Cloudbursts have caused only temporary interference with traffic, and cloudburst damage has been about average. Snow conditions have been light with no road closures.





STATISTICS



TABLE 1

STATEMENT OF RECEIPTS

Classification	1917-1954	1955	1956	Total	Percent
Federal participation on construction.....	\$82,788,847.48	\$5,021,089.95	\$7,695,881.65	\$95,505,819.08	49.27
Gasoline and fuel tax (gross).....	16,872,413.00	3,213,432.36	6,006,522.43	90,030,774.69	31.01
Common carrier license.....	16,872,413.00	3,213,432.36	1,178,523.40	15,241,143.73	7.86
Auto license fees.....	8,723,327.10	570,982.36	1,170,619.49	10,664,539.45	5.50
Driver's license.....	911,744.00	91,174.40	153,541.10	984,509.31	.51
Miscellaneous.....	1,819,044.38	48,319.71	81,506.20	1,954,870.32	1.01
City participation on construction.....	515,323.41	36,706.05	53,300.80	570,626.21	.29
State of California participation on construction.....	121,580.14	36,706.05	36,706.05	145,103.30	.08
State Airport Fund participation on construction.....	10,000.00	23,514.16	-----	40,000.00	.02
Legislative appropriation.....	1,869,468.87	-----	-----	1,869,468.87	.36
State tax on title.....	147,428.96	-----	-----	44,509.05	.02
Racing Commission fees.....	147,428.96	-----	-----	147,428.96	.08
Contractor's license.....	16,923.23	-----	-----	16,923.23	.01
State Highway bonds.....	1,900,000.00	-----	-----	1,900,000.00	.38
County participation on state maintenance.....	4,129,520.79	-----	-----	4,129,520.79	2.13
County participation on county maintenance performed by State.....	59,000.00	-----	-----	59,000.00	.03
Lincoln Highway participation on construction.....	116,654.73	-----	-----	116,654.73	.06
Utah-Nevada-California Association participation on construction.....	71,426.60	-----	-----	71,426.60	.04
San Francisco-Bay City participation on construction.....	23,831.47	-----	-----	23,831.47	.01
Railway participation on grade-crossing construction.....	25,000.00	-----	-----	25,000.00	.01
Totals.....	197,053.30	-----	-----	197,053.30	.10
*Miscellaneous: Receipts from other State departments, Federal agencies and outside parties for services rendered or materials furnished.	\$164,774,583.76	\$12,723,340.71	\$16,349,055.57	\$193,846,980.04	100.00

TABLE 2

STATEMENT OF DISBURSEMENTS

Classification	1917-1954	1955	1956	Total	Percent
Construction work	\$106,563,838.05	\$7,764,492.39	\$9,234,190.87	\$123,562,521.31	64.51
General maintenance	27,956,464.41	2,407,823.04	2,759,702.90	33,133,995.35	17.29
Surveys, plans, estimates and right-of-way	7,854,955.21	1,009,267.06	1,195,953.78	10,060,216.05	5.25
Miscellaneous*	1,898,205.58	57,655.29	90,437.42	1,846,298.29	.96
Public Service Commission, salaries	1,906,000.00	6,703.59	48,494.00	1,457,797.59	.08
Public Service Commission, Safety Division	143,102.45	14,673.87		157,775.32	.08
Public Service Commission, Highway Patrol	1,555,218.47	310,250.15	462,423.50	1,967,892.12	1.03
Public Service Commission, Drivers License Division	706,912.74	73,230.51	101,463.90	881,607.15	.46
Public Service Commission, Motor Vehicle Division	307,164.42	95,517.74	111,432.00	514,114.16	.28
Public Service Commission, inspectors	545,529.82			545,529.82	.29
Maintenance buildings	1,411,404.85	380,023.89	396,909.48	2,188,344.22	1.14
State Office Buildings transfer of funds	1,885,000.00		165,000.00	2,050,000.00	.24
General administration	4,352,737.63	352,403.31	320,553.46	5,025,759.40	2.62
Equipment divisions and plants	4,092,515.93	223,683.79	406,769.96	4,722,969.68	2.47
Common carrier and truck refunds	4,317,321.15	8,098.05	7,163.32	4,322,582.52	2.27
Gasoline and use fuel tax refunds	2,976,688.61	28,001.54	219,612.87	3,414,303.02	1.78
Gasoline tax administration	160,810.26	12,304.91	44,894.94	218,010.11	.11
Use fuel tax administration	107,436.66	14,870.34		122,367.00	.06
Research and investigation	832,063.87	176,726.63	242,588.68	1,251,379.18	.65
Highways and Parks magazine	295,221.37	37,997.48	43,703.24	376,921.09	.20
Public relations	67,603.17	9,173.49	8,525.94	85,302.60	.05
Road information	29,160.77			29,160.77	.02
Road maps	64,758.71	15,766.90	17,546.55	98,072.96	.05
Roadside improvement	19,851.05			19,851.05	.01
July traffic count	209,990.07	16,443.91	17,889.34	244,323.32	.13
Totals	\$162,477,488.93	\$13,205,120.88	\$15,865,255.15	\$191,547,844.96	100.00
Transfer to Revolving Fund	92,452.02			92,452.02	
Totals	\$162,569,920.95	\$13,205,120.88	\$15,865,255.15	\$191,640,296.98	

*Miscellaneous: Charges to other State departments, Federal agencies and outside parties for services rendered or materials furnished for which the department is to be reimbursed.

Reconciliation—

Total receipts	\$193,846,980.04
Total disbursements	191,640,296.98
State Highway balance, July 1, 1956	\$2,206,683.06
Lists filed July 5, included in disbursements	1,114,363.33
State Controller's balance, July 1, 1956	\$3,321,046.39

TABLE 3

FEDERAL-AID ALLOTMENTS

1921	and prior—Regular—	\$3,527,276.18	1940	Regular (reapportioned from other states)	\$6,718.00	1951	Urban	\$53,853.00
1922	Regular	923,136.58		Secondary highways		1952	Regular	2,885,661.00
1923	Regular	826,623.52	1940	Secondary (reapportioned from other states)		1953	Secondary highways	1,928,291.00
1924	Regular	917,623.25		Secondary highways		1954	Urban	92,917.00
1925	Regular	946,576.00		Secondary highways		1955	Regular	2,863,524.00
1926	Regular	918,216.00	1940	Grade crossings	690.00	1956	Secondary highways	1,913,466.00
1927	Regular	948,510.00		(reapportioned from other states)		1957	Urban	32,199.00
1928	Regular	947,992.00		Regular	781.00	1958	Regular	3,174,465.00
1929	Regular	940,372.00	1941	Secondary highways	1,462,071.00	1959	Secondary highways	2,121,392.00
1930	Public lands	588,910.00	1941	Grade crossings	190,705.00	1960	Urban	192,203.00
1931	Regular	1,601,408.00	1941	Public lands	146,250.00	1961	Federal lands	400,000.00
	Unused portion		1941	Grade crossings	136,062.00	1962	Interstate	322,835.00
1931	Advance	4,288.00	1941	Regular (reapportioned from Georgia)	4,919.00	1963	Regular	3,179,310.00
1932	Regular	904,961.83		Secondary (reapportioned from Georgia)		1964	Secondary highways	2,194,823.00
1933	Public lands	1,598,987.00	1941	Grade crossings	738.00	1965	Urban	102,729.00
1934	Regular	440,685.00	1941	Grade crossings		1966	Interstate	323,336.00
1935	Emergency	1,421,688.63		(reapportioned from Georgia)		1967	Regular (Primary)	4,077,521.00
1936	National recovery	1,575,758.00	1942	Regular	358.00	1968	Secondary highways	2,735,122.00
1937	National recovery	4,515,917.00	1942	Secondary highways	1,274,718.00	1969	Urban	1,785,146.00
1938	Public lands	2,342,356.00	1942	Grade crossings	223,076.00	1970	Federal lands	3,955,058.32
1939	Public lands	549,125.00	1942	Public lands	97,500.00	1971	Regular (Primary)	4,067,717.00
1940	Public lands	1,595,501.00	1942	Regular	310,892.00	1972	Regular (Primary)	706,600.00
1941	Works program, highway	553,135.00	1943	Secondary highways	1,275,386.00	1973	Secondary highways	2,718,588.00
1942	Works program, grade-crossing	2,213,071.00	1943	Grade crossings	223,193.00	1974	Urban	472,305.00
1943	Regular	887,260.00	1943	Strategic, net	97,500.00	1975	Secondary highways	132,088.00
1944	Regular	1,593,978.00	1943	Advance engineering	318,847.00	1976	Urban	93,939.00
1945	Regular	1,632,385.00	1943	Regular	127,539.00	1977	Interstate	1,784,039.00
1946	Secondary highways	326,477.00	1946	Secondary highways	1,921,867.00	1978	Interstate	10,440,057.00
1947	Grade-crossing		1947	Urban	60,613.00	Subtotal		\$121,761,827.78
1948	Elimination	250,000.00	1947	Regular	2,868,649.00	OTHER FEDERAL FUNDS UTILIZED		
1949	Public lands	560,201.00	1947	Secondary highways	1,922,269.00	Defense Act access funds		\$1,958,757.90
1950	Regular	1,590,172.00	1947	Urban	60,613.00	Postwar access funds		692,811.90
1951	Secondary highways	318,034.00	1947	Regular	2,829,804.00	Flight strips (special)		637,513.04
1952	Grade crossings	243,750.00	1948	Secondary highways	1,896,280.00	Flight strips (regular)		569,452.02
1953	Public lands	559,895.00	1948	Urban	59,836.00			
1954	Regular	1,275,938.00	1950	Regular	2,564,998.00			
1955	Secondary highways	1,101,391.00	1950	Secondary highways	1,718,707.00	Subtotal		\$3,858,534.86
1956	Grade crossings	97,500.00	1951	Urban	53,853.00			
1957	Public lands	242,442.00	1951	Regular	2,562,973.00	Total		\$125,623,362.64
1958	Public lands		1951	Secondary highways	1,717,381.00			

TABLES 4&5

MAINTENANCE—FISCAL YEAR ENDING JUNE 30, 1955

MILEAGE BY ROAD TYPES

	Miles	Percent
1. Earth		
Unimproved		
Graded and drained		
2. Gravel	160.4	4.1
3. Mixed bituminous	3,748.7	94.8
Roadmix	2,804.6	
Plantmix	944.1	
4. Other hard surface	43.7	1.1
Portland cement concrete	2.7	
Bituminous concrete	3.8	
Bituminous penetration	13.2	
Bituminous surface-treated	22.0	
Totals	3,952.8	100.0

MILEAGE BY SYSTEMS

1. Federal-aid primary	2,183.1	55.2
Rural	2,131.7	
Urban	51.4	
2. Federal-aid secondary	1,673.9	42.4
Rural	1,663.1	
Urban	10.8	
3. State system	95.8	2.1
Rural	92.5	
Urban	3.3	
Totals	3,952.8	100.0

MAINTENANCE—FISCAL YEAR ENDING JUNE 30, 1956

MILEAGE BY ROAD TYPES

	Miles	Percent
1. Earth		
Unimproved		
Graded and drained		
2. Gravel	170.4	4.2
3. Mixed bituminous	3,814.1	94.7
Roadmix	2,772.5	
Plantmix	1,041.6	
4. Other hard surface	42.1	1.1
Portland cement concrete	1.6	
Bituminous concrete	3.3	
Bituminous penetration	15.1	
Bituminous surface-treated	22.1	
Totals	4,026.6	100.0

MILEAGE BY SYSTEMS

1. Federal-aid primary	2,194.0	54.5
Rural	2,143.8	
Urban	50.2	
2. Federal-aid secondary	1,736.8	43.1
Rural	1,720.4	
Urban	16.4	
3. State system	95.8	2.4
Rural	92.5	
Urban	3.3	
Totals	4,026.6	100.0

EXPENDITURES FOR VARIOUS MAINTENANCE OPERATIONS ON ALL ROADS MAINTAINED BY THE DEPARTMENT DURING FISCAL YEAR ENDING JUNE 30, 1955

Operation	Expenditures	Percent
Patching holes, ruts and spot sealing.....	\$454,839.90	18.89
Drilling, blading, reshaping, etc.....	38,245.30	1.59
Filling, trimming, expansion joints and cracks.....	126.36	.01
Applying light seal and blotter or chips.....	100,944.74	4.19
Repairing of cuts, fills and slopes.....	143,708.20	5.97
Cleaning and retrenching drains, channels, etc.....	33,043.03	3.36
Removal of debris.....	285,431.46	11.35
Roadside development and landscaping projects.....	9,537.64	.40
Repair and maintenance of sidewalks, retaining walls, etc.....	23,671.92	.98
Halogeton control (special control operations).....	3,243.13	.13
Erection and removal of snow fence, markers, etc.....	19,887.15	.83
Snow and ice removal.....	288,738.97	10.15
Sanding icy surfaces.....	61,341.11	2.55
Opening waterways and gutters due to snow and ice.....	5,188.91	.22
Removal of sand drifts.....	2,308.27	.10
Maintaining road blockades during storms.....	18.37	.01
Repainting, repainting, resetting markers, signals, etc.....	154,236.06	6.40
Repair and maintenance of guardrails.....	97,302.53	4.04
Highway, bridge and approach lighting.....	13,322.36	.55
Comfort stations and picnic ground operations.....	11,422.10	.48
Traffic and pedestrian crossing markings.....	11,446.16	.48
Patrolling for the protection of the public.....	26,282.38	1.06
Patching, dragging, blading shoulders and approaches.....	38,250.79	1.59
Bituminous treatment of shoulders.....	242,237.21	10.06
Construction of new approaches.....	14,232.68	1.42
Reprocessing bituminous shoulder surfaces.....	14,118.08	.58
Extraordinary repairs due to catastrophe.....	6,318.96	.26
Application of dust palliatives.....	59,646.19	2.48
Sand, gravel and crushed stone replacement.....	743.72	.01
Bituminous surface treatment.....	52,683.61	.93
Heavy chips and seal.....	49,884.49	2.18
Cleaning and opening channels.....	9,916.18	3.89
Repairs to structures.....	7,257.58	.99
Painting and linseed oil treatment to structures.....	6,447.19	.23
Pumping plants and electricity in structures.....	1,870.12	.08
Bridge and structure inspections.....	4,815.32	.20
Total direct expenditures.....	1,487.63	.06
Maintenance administration (Headquarters).....	\$2,382,030.77	98.93
Total for fiscal year 1954-1955.....	25,797.27	1.07
Total miles maintained: 3,952.773 miles.	\$2,407,828.04	100.00
Average cost of maintenance per mile (includes snow removal).....		\$609.15
Average cost of maintenance per mile (excludes snow removal).....		\$521.83

EXPENDITURES FOR VARIOUS MAINTENANCE OPERATIONS ON ALL ROADS MAINTAINED BY THE DEPARTMENT DURING FISCAL YEAR ENDING JUNE 30, 1956

Operation	Expenditures	Percent
Patching holes, ruts, and spot sealing.....	\$487,931.25	17.68
Drugging, blading, reshaping, etc.....	31,904.13	1.16
Filling, trimming expansion joints and cracks.....	223.89	.01
Applying light seal and blotter or chips.....	112,370.03	4.07
Repairing of cuts, fills and slopes.....	160,091.68	5.80
Cleaning and retrenching drains, channels, etc.....	145,427.31	5.37
Removal of debris.....	237,297.54	8.60
Roadside development and landscaping projects.....	7,797.20	.28
Repair and maintenance of sidewalks, retaining walls, etc.....	31,700.64	1.15
Halogeton control (special control operations).....	383.34	.01
Erection and removal of snow fences, markers, etc.....	20,674.51	.75
Snow and ice removal.....	294,040.16	10.65
Sanding icy surfaces.....	52,729.62	1.91
Opening waterways and gutters due to snow and ice.....	6,232.44	.23
Removal of sand drifts.....	1,582.63	.06
Maintaining road blockades during storms.....	1,827.70	.07
Repairing, repainting, resetting markers, signals, etc.....	178,697.53	6.48
Traffic lane and center striping.....	110,207.82	3.99
Highway, bridge, and approach lighting.....	17,088.62	.62
Repair and maintenance of guardrails.....	61.06	.01
Comfort stations and picnic ground operations.....	14,683.79	.53
Traffic and pedestrian crossing markings.....	7,553.95	.27
Patrolling for the protection of the public.....	47,131.12	1.71
Patching, dragging, blading shoulders and approaches.....	252,489.60	9.15
Bituminous treatment of shoulders.....	45,609.85	1.55
Construction of new approaches.....	15,506.50	.56
Reprocessing bituminous shoulder surfaces.....	1,765.23	.06
Extraordinary repairs due to catastrophe.....	256,762.44	9.30
Application of dust palliatives.....	3,027.08	.11
Sand, gravel, and crushed stone replacement.....	41,942.52	1.52
Reprocessing bituminous surfaces.....	106,644.25	3.86
Bituminous surface treatment.....	32,272.71	1.17
Heavy chips and seal.....	2,065.76	.07
Cleaning and opening channels.....	1,907.90	.07
Repairs to structures.....	4,338.54	.02
Painting and linseed oil treatment to structures.....	4,289.68	.16
Pumping plants and electricity in structures.....	1,705.26	.06
Bridge inspections.....		
Total direct expenditures.....	\$2,734,110.28	99.07
Maintenance administration (Headquarters).....	25,592.62	.93
Total for fiscal years 1955-1956.....	\$2,759,702.90	100.00
Total miles maintained: 4,026,560 miles		
Average cost of maintenance per mile (includes snow removal).....		\$685.37
Average cost of maintenance per mile (excludes snow removal).....		\$592.57

TABLE 8

MAINTENANCE COSTS FROM 1918-1956 INCLUDES SNOW REMOVAL

	Mileage		Mileage
1918	-----	1937	2,697.82
1919	-----	1938	2,770.20
1920	-----	1939	2,805.90
1921	-----	1940	2,908.48
1922	-----	1941	2,941.22
1923	442.98	1942	3,015.76
1924	765.23	1943	3,047.80
1925	903.90	1944	3,084.67
1926	1,213.43	1945	3,081.74
1927	1,445.08	1946	3,093.24
1928	1,680.73	1947	3,273.01
1929	1,875.16	1948	3,421.74
1930	1,965.43	1949	3,507.98
1931*	2,061.34	1950	3,565.95
1932	2,113.02	1951	3,750.08
1933	2,151.64	1952	3,770.62
1934	2,287.37	1953	3,899.91
1935	2,524.77	1954	3,915.45
1936	2,655.68	1955	3,952.72
		1956	4,026.56
			2,759,702.90
			\$846,033.35
			756,305.26
			830,377.60
			763,075.33
			774,573.50
			848,789.57
			745,480.25
			703,340.85
			773,778.26
			855,194.89
			1,051,422.22
			1,256,025.61
			1,429,074.18
			1,469,479.06
			1,620,297.11
			2,256,174.39
			2,158,452.76
			2,515,338.95
			2,407,828.04
			2,759,702.90

*Seven months' expenditure, December 1, 1930 to June 30, 1931.

TABLE 10

CONSTRUCTION AND RECONSTRUCTION COMPLETED AND UNDER CONTRACT ON THE DESIGNATED STATE HIGHWAY SYSTEM AT THE CLOSE OF THE BIENNIUM

Type	Miles new construction completed during biennium	Miles reconstruction completed during biennium	Miles new construction under contract at close of biennium	Miles reconstruction under contract at close of biennium	Totals
Gravel	140.7	13.5	79.9	438.0	272.1
Roadmix	10.9	*292.0	12.2	†115.9	431.0
Plantmix	-----	-----	-----	-----	-----
Totals	151.6	305.5	92.1	153.9	703.1

*Includes 19.8 miles constructed with Forest Highway Funds by Bureau of Public Roads.
†Includes 5.1 miles constructed with Forest Highway Funds by Bureau of Public Roads.
‡Includes 15.7 miles constructed with Indian Service Funds by Bureau of Public Roads.

TABLE 11

BRIDGE AND GRADE SEPARATION SUMMARY STRUCTURES BUILT BY STATE HIGHWAY DEPARTMENT

Type	Constructed or under construction as of June 30, 1954	Constructed during biennium or under construction June 30, 1956	Structures abandoned during biennium	Total as of June 30, 1956	Structures on highway system not built by State Highway Department	Total structures as of June 30, 1956
Plain concrete	4	0	0	4	1	5
Reinforced concrete	129	19	4	144	1	145
Structural steel	28	1	0	29	10	39
Timber	46	0	5	41	9	50
Composite structures (reinforced concrete and structural steel)	11	0	0	11	0	11
Totals	218	20	9	229	21	250
Total length of structures in feet	19,966	1,558	761	20,763	1,778	22,541
Average length of bridge in feet	92	78	85	91	85	90

DESCRIPTION OF FEDERAL-AID ROADS, JUNE 30, 1956

F. A.
Road
No.

F. A. Road No.	Termini	Mileage
1	U. S. 40 from the California-Nevada state line near Verdi via Reno, Sparks, Fernley, Lovelock, Winnemucca, Battle Mountain, Elko and Wells to the Nevada-Utah state line at Wendover, except those portions in the Reno-Sparks and Elko urban areas.	416.7
2	U. S. 50 and Alternate U. S. 50, from the California-Nevada state line southwest of Spooners via Carson City, Dayton, Fallon, Austin, Eureka, and Ely to a junction with U. S. 40 near Wendover.	467.2
3	U. S. 395 from the California-Nevada state line south of Holbrook via Minden to a junction with U. S. 50 three miles south of Carson City; beginning again in Carson City and continuing through Reno to the Nevada-California state line northwest of Reno, except that portion within the Reno urban area.	81.5
4	U. S. 6 from the California-Nevada state line southwest of Basalt, via Coaldale and Tonopah to a junction with U. S. 50 in Ely; beginning again in East Ely and via Connors Pass and Sacramento Pass to the Nevada-Utah state line en route to Delta, Utah.	306.5
5	U. S. 91 from the California-Nevada state line south of Jean via Jean, Las Vegas, North Las Vegas (along both Fifth and Main Streets), Glendale, and Mesquite to the Nevada-Arizona state line, except that portion within the Las Vegas urban area.	126.9
6	U. S. 95 from the California-Nevada state line south of Searchlight via Searchlight, Railroad Pass, Las Vegas, Beatty, Goldfield, Tonopah, Mina, and Hawthorne to a junction with U. S. 50 south of Fallon; beginning again at the junction with U. S. 50 at Leeterville via Hazen to a junction with U. S. 40 east of Fernley; beginning again at the junction of U. S. 40 in Winnemucca via Orovida to the Nevada-Oregon state line at McDermitt; also a spur from Railroad Pass via Boulder City to the Nevada-Arizona state line at Hoover (Boulder) Dam, except that portion within the Las Vegas urban area.	520.8
7	U. S. 93 from Caliente via Pioche to a junction with U. S. 6 at the east foot of Connors Pass; beginning again at the junction of Alternate U. S. 50, five miles south of the Elko-White Pine County line via Currie, Wells and Contact to the Nevada-Idaho state line north of Contact.	252.0
8	State Route 25 from a junction with U. S. 93 one mile west of Panaca via Panaca to the Nevada-Utah state line en route to Modena, Utah.	20.9
9	Kietzke Lane—From F. A. Rt. 3 near the south urban limit of Reno to Sparks	4.2

TABLE 13

TABLE SHOWING STATUS OF MILEAGE ON THE VARIOUS
"STATE INTEREST" HIGHWAY SYSTEMS IN
NEVADA AS OF DECEMBER 31, 1955

County	IMPROVED BY STATE HIGHWAY DEPARTMENT			Total	*State-interest roads not improved by State	Grand total all types and all systems
	Federal-aid system	secondary system	Remaining State highway system			
Churchill	147.5	67.2	214.7	214.7	38.6	253.3
Clark	273.4	136.4	451.0	451.0	219.2	670.2
Douglas	49.4	39.5	90.3	90.3	16.8	107.1
Elko	331.2	183.4	514.6	514.6	309.1	823.7
Esmeralda	115.2	65.7	230.2	230.2	21.7	251.9
Eureka	74.0	30.7	164.8	164.8	139.0	303.8
Humboldt	135.3	106.1	241.5	241.5	177.1	418.6
Lander	103.9	153.8	250.3	250.3	118.6	368.9
Lincoln	99.8	153.7	252.8	252.8	144.8	397.6
Lyon	62.1	199.7	266.8	266.8	97.7	364.5
Mineral	108.6	99.8	201.4	201.4	34.4	235.8
Nye	240.7	185.8	432.3	432.3	241.8	674.1
Ormsby	20.7	11.4	38.9	38.9	1.7	40.6
Pershing	75.0	38.6	113.6	113.6	180.5	294.1
Storey	92.3	132.8	127	127	22.8	154.5
Washoe	264.9	121.7	386.6	386.6	337.1	723.7
White Pine					124.0	510.6
Totals	2,194.0	1,731.3	4,021.1	4,021.1	2,214.9	6,236.0

MILEAGE BY SURFACE TYPES AND SYSTEMS AS OF DECEMBER 31, 1955

Type	Federal-aid system	secondary system	Remaining State highway system	Total	*State-interest roads not improved by State	Grand total all types and all systems
A-B—Primitive and unimproved	---	---	---	---	---	---
C-D—Graded and drained and soil-surfaced	---	---	---	---	---	---
E—Gravel or crushed stone	---	99.3	71.1	170.4	743.5	743.5
F—Bituminous surface treated	---	21.7	0.4	22.1	245.6	245.6
G—Roadmix or plantmix surface	2,180.9	1,604.1	23.6	3,808.6	1,148.2	1,318.6
H—I—High type bituminous	12.3	5.5	0.6	18.4	55.1	43.5
J—Portland cement concrete	0.8	0.7	0.1	1.1	1.1	1.6
Totals	2,194.0	1,731.3	95.8	4,021.1	2,214.9	6,236.0

*State-interest roads are all routes on the State Designated System or the Federal-aid Secondary System.
†1.1 miles WA-08 and 1.5 miles on WA-53 proposed.

TABLE 14

COMPARISON OF AVERAGE DAILY TRAFFIC AT AUTOMATIC RECORDERS FOR EIGHT FISCAL YEAR PERIODS

	Station	DAILY AVERAGE							
		1947-1948	1948-1949	1949-1950	1950-1951	1951-1952	1952-1953	1953-1954	1954-1955
101	U. S. 40, east of Sparks	2,381	2,286	2,573	2,825	2,990	3,260	3,555	3,904
102-A	U. S. 91 and 466, south of Las Vegas	2,347	2,497	2,561	3,325	3,940	4,463	5,073	5,465
103	State Route 46, south of Elko	2,390	309	417	424	500	564	580	654
104	U. S. 395, north of Carson City	1,820	1,688	1,847	2,035	2,132	2,396	2,674	2,864
106	State Route 59, south of Lovelock	316	314	334	392	394	393	394	299
107	U. S. 40, east of Elko	1,424	1,513	1,794	2,176	2,307	2,527	2,476	2,553
108	U. S. 50 and 93, north of McGill	488	475	499	587	644	665	691	753
109	U. S. 6 and 93, south of East Ely	440	438	432	509	556	637	761	849
110	U. S. 93 and 95, southeast of Las Vegas	4,905	5,072	5,626	6,330	8,050	9,606	10,504	11,323
111	U. S. 6 and 95, west of Tonopah	461	465	427	586	611	712	750	830
114	U. S. 95, northwest of Las Vegas	395	404	427	613	1,419	1,304	1,124	1,602
115-A	U. S. 40, east of Wells	819	847	905	1,264	1,314	1,378	1,569	1,592
116	U. S. 40, west of Verdi	2,104	2,153	2,485	2,731	2,843	3,343	3,741	3,658
117	State Route 12, north of Logandale	372	372	387	421	453	511	537	562
118	U. S. 50, east of Spooners	961	1,017	1,086	1,114	1,311	1,476	1,848	1,911
119	State Route 3, south of Yerington	455	527	554	599	670	787	938	991
120	U. S. 91 and 93, north of Nellis Air Base	---	---	1,567	1,804	2,131	2,306	2,579	2,614
121	U. S. 40 and 95, northeast of Lovelock	---	---	1,400	1,658	1,822	1,859	2,051	2,104
122	U. S. 40, west of Battle Mountain	---	---	1,078	1,322	1,471	1,594	1,885	1,720
123	U. S. 50, one mile west of Peterson's Maintenance Station	---	---	---	---	---	---	242	262
124*	State Route 27, west of U. S. 395	---	---	---	---	---	---	---	773

*Recorder No. 124 installed January 1, 1955.

IN APPRECIATION OF GOOD AND FAITHFUL SERVICE

35 YEARS OR MORE OF SERVICE

BERNING, A. (DUTCH), JR.	HOLCOMB, WILLIAM T.
GLOCK, J. A.	POHL, ERNEST C.
REID, BONNIE OLA	

30 TO 35 YEARS

ARMSTRONG, G. F.	PARRY, W. R.
DUNN, WALTER E.	RAWLS, PAUL R.
HANCOCK, J. L.	ROSE, DALE V.
HEIDENREICH, ANDREW	SCHULTZ, MARION I.
LEWIS, ROBERT J.	SULLIVAN, JOHN M.
LOGAN, BEN W.	SUTHERLAND, DAVID L.
MILLS, H. D.	WRIGHT, W. O.

25 TO 30 YEARS

BLAKER, CHARLES C.	HEAPS, WILFORD
BODEN, ELDOR J.	LITTLE, L. W.
BROWN, CHARLES L.	MCMURTREY, E. A.
BROWN, H. COLEMAN	MORRISON, F. H.
CLYDE, VICTOR W.	PERRY, JAMES A.
CROSS, ERNEST	ROY, ROLAND F.
DRON, THOMAS L.	SHARPE, DAVE
ELDRIDGE, REUBEN E.	SQUIRES, HERBERT A.
HARMER, FRANCIS J.	VAUGHAN, HAROLD J.
HAYS, D. H.	WAITE, MARVIN H.

20 TO 25 YEARS

BAXTER, GEORGE M.	GREENHALGH, JACK F.
BOARDMAN, E. T.	HANNIG, REED A.
BONAFIOUS, JOE	HARBIN, GUY
BORNGA, VICTOR	HOWARD, A. A.
BROCKWAY, G. B.	KINNE, A. G.
CARROLL, FRANK J.	KOONTZ, LOUIS
CHRISTENSEN, JOSEPH O.	KRAMER, AMBROSE T.
COCHRAN, L. F.	LANE, BRUCE M.
COLEMAN, GEORGE P.	LEAVITT, VINCEN E.
DOTY, STANLEY P.	LEAVITT, THOMAS P., JR.
FELL, VERRILL W.	MANHIRE, JOHN T.
FODRIN, MELVIN J.	MEACHAM, J. D.
GIBSON, W. H.	MAYETT, ALBERT W.

The Twentieth Biennial Report of the Nevada Department of Highways is dedicated to the many employees whose faithful service of 15 or more years has been an essential factor in making Nevada one of the leaders among road builders of the Nation. This report gives opportunity to mention the names of those who have been with the Department for 15 years or more.

20 TO 25 YEARS—*Continued*

MEDER, ZITA D.	REAM, MARY L.
MCINNIS, J. R.	ROBBINS, PAUL E.
MILES, CYRIL D.	SMITH, CHARLES F.
MURPHY, CORNELIOUS E.	SPRINGMEYER, CARL A.
ODELL, W. ALLAN	SUNDEEN, STANLEY D.
OTTINI, RALPH J.	WALKER, OREN W.
PARVIN, JACK	WELSH, ANDREW
WILLIAMS, ZEDDIE A.	

15 TO 20 YEARS

BARRETT, RALPH D.	HAYMAN, WALTER F.
BAWDEN, JOHN E.	JOHNSON, ORRIN H.
BIGGS, ROBERT B.	JOSEPH, OWEN W.
BLOXHAM, L. J.	KILLEEN, JAMES H.
BRADLEY, DELILE	KINNIKIN, MARGARET
BRADLEY, RALPH W.	KIRN, CHARLES
BROTHERTON, HARRY	KRAMER, JESSIE J.
CHAMBERS, L. G.	MANCHESTER, JAMES
CLEVINGER, HOWARD	MATHEWS, WOODROW G.
CUNNINGHAM, ANGELINE	MCCARDLE, JOHN E.
DAVIS, ALLEN A.	MCDERMOTT, TONY H.
DAVIS, FRED A.	MCDONALD, MARGARET
DECK, TED	METZGER, HARRY M.
DEPRATI, PETE	MOORE, LEMUEL M.
DONATI, GUIDO	OFFEN, ELMER B.
DUBE, PAUL J.	O'SULLIVAN, JAMES
FARNSWORTH, L. GRANT	PIERETTI, EUGENE
FISHER, FRANK	PRATT, JOHN W.
GALLAGHER, THOMAS L.	RAINEY, CHARLES P.
GARDNER, BILL G.	RATTAZZI, ADELE
GARRETT, JAMES L.	REED, CHESTER H.
GAY, DONALD V.	REIL, ORVIS E.
GIRAUD, JOSEPH J., JR.	ROCHON, MARY
GOBELI, FRED	ROSS, MILTON F.
GOMES, JOSEPH V.	SANBORN, JACK W.
GREGORY, J. J.	SCHULTZ, JOSEPH E.
GRIER, GEORGE R.	SMITH, C. WILLIAM
HAFFEY, JOHN J.	STEVENS, GLEN S.
HAMP, LEONARD H.	ZILKEY, WILLARD O.

In Memoriam

During the biennium the following employees of the
Department of Highways were taken by death:

JOSEPH J. ADUCCI

EVERETT J. BANKS

RALPH H. BENNETTS

HARRY L. BOLANDER

DALE E. BORDEN

HAROLD T. COBB

JOHN CORNING

JAMES L. CROSS

ARTHUR T. GREEN

WILLIAM D. KLITZ

JOHN W. MCGRATH

BRYANT H. PIERCE

JOE ROCHON, JR.

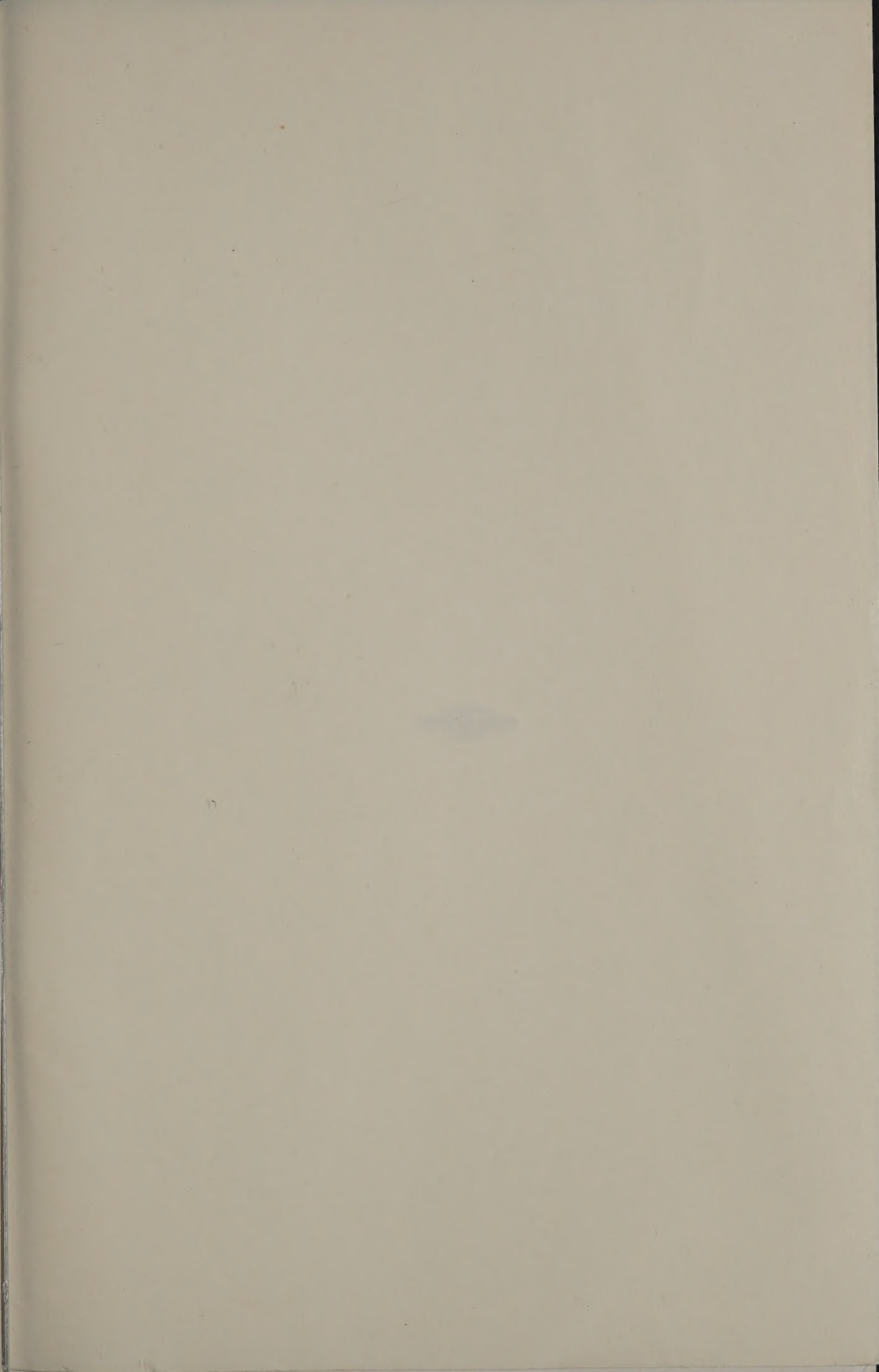
FRANKLIN E. STEINER

ALONZO G. TIRRELL

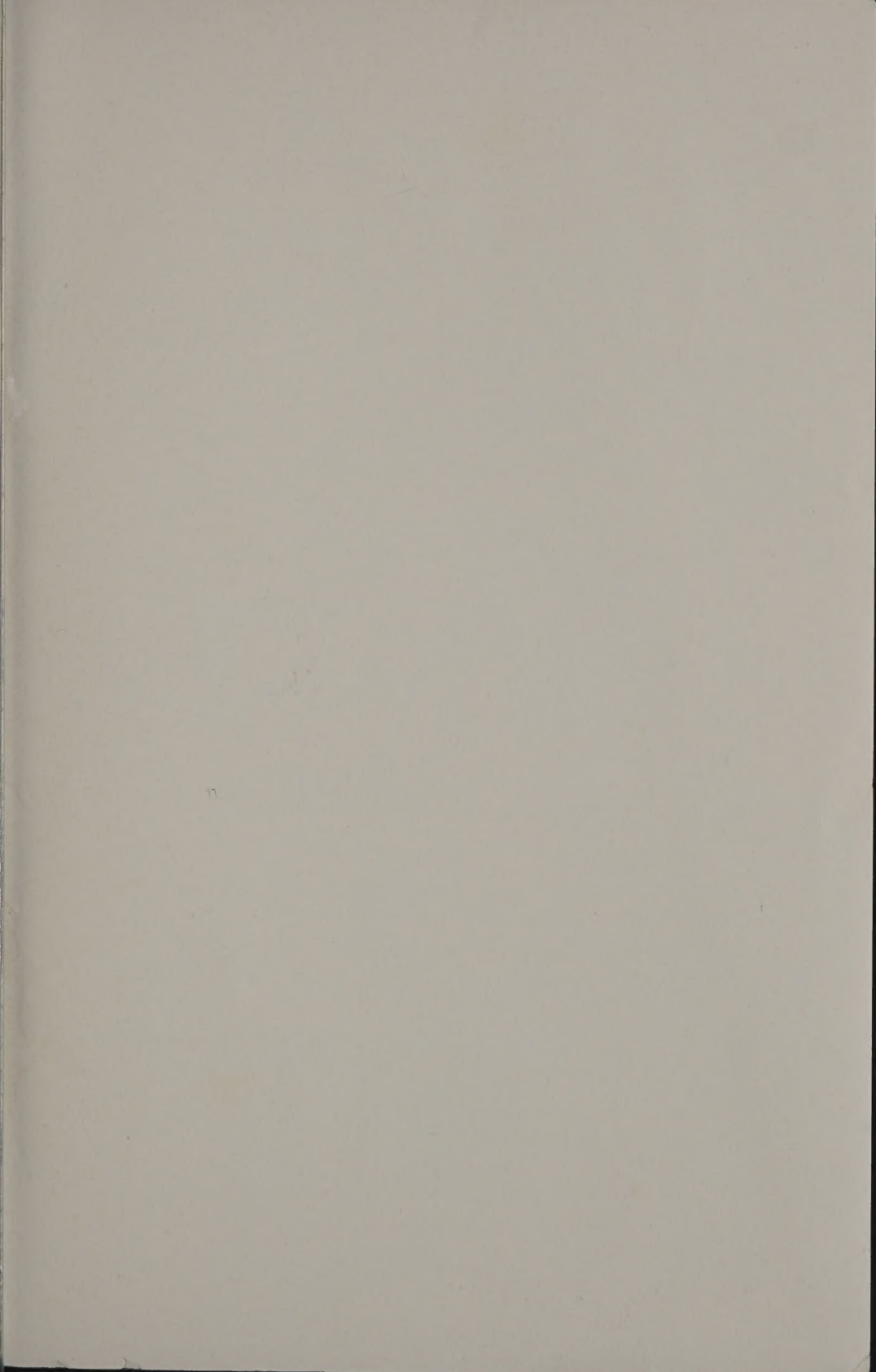
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